UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

December 31, 2024

Refer to NMFS No:
WCRO-2024-03071

Susan F. Zaleski
Chief, Environmental Consultation and Coordination Section
Bureau of Ocean Energy Management, Pacific Region
760 Paseo Camarillo; Suite 102
Camarillo, California 93010-6064

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Bureau of Ocean Energy Management's 2024 Reinitiation - Offshore Wind Post-Lease Site Characterization and Assessment Activities for the Morro Bay and Humboldt Wind Energy Areas

Dear Ms. Zaleski:

On December 4, 2024, NOAA's National Marine Fisheries Service (NMFS) received your request for reinitiation of consultation and written concurrence that the Bureau of Ocean Energy Management's (BOEM) proposed modifications to post-lease activities, including site characterization and assessment activities (Project), offshore of central and northern California pursuant to the Energy Policy Act of 2005, is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated, or species proposed for listing, under the Endangered Species Act (ESA).

This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA and implementing regulations at 50 CFR 402. This consultation document replaces the previous letter of concurrence completed on September 21, 2022 (NMFS# WCRO-2022-01796), and the previous letter of concurrence is no longer in effect. Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 84 Fed. Reg. at 45015; 89 Fed. Reg. at 24268. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this letter of concurrence would not have been any different under the 2019 regulations or pre-2019 regulations.

This letter of concurrence includes an analysis of effects on sunflower sea star (*Pycnopodia helianthoides*), a species proposed for listing under the ESA (50 CFR 223.102).

NMFS also received your request for reinitiation of essential fish habitat (EFH) consultation. NMFS reviewed the proposed action for potential effects on EFH pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. We have concluded that the action would adversely affect EFH designated under the Pacific Coast Salmon, Coastal Pelagic Species, Pacific Coast Groundfish, and Highly Migratory Species Fishery Management Plans (FMPs). NMFS has provided three EFH conservation recommendations.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the Environmental Consultation Organizer (https://www.fisheries.noaa.gov/resource/tool-app/environmental-consultation-organizer-eco). A complete record of this consultation is on file at NMFS' WCR in Long Beach, California.

Consultation History

On October 17, 2024, NMFS met with BOEM to discuss the scope and need for reinitiation of ESA and EFH consultations.

On October 24, 2024, BOEM provided a draft biological assessment (BA) and EFH assessment (EFHA) for NMFS' review. NMFS provided feedback to BOEM via email on the draft BA/EFHA on November 8, 2024.

On December 4, 2024, NMFS received BOEM's request for reinitiation of informal ESA consultation, and for EFH consultation on the proposed action. In addition to this letter, BOEM submitted to NMFS an updated BA/EFHA.

On December 4, 2024, BOEM submitted their final BA and EFHA, and NMFS determined that sufficient information was provided in order to initiate informal consultation for the ESA-listed species and critical habitats listed in Table 7 as well as for EFH.

On December 10, 2024, NMFS requested clarification via email regarding BOEM's ESA determinations for marine mammals and sea turtles, and which species BOEM was requesting informal ESA consultation for. On December 11, 2024, BOEM provided clarification via email regarding their ESA determinations and confirmed their no effect determination for the North Pacific right whale.

On December 11, 2024, NMFS requested clarification from BOEM regarding the designated critical habitats for listed salmonid species that overlap with the proposed action area. On December 11, BOEM provided confirmation of which designated critical habitats overlap the action area and may be affected by the proposed action.

On December 26, 2024, NMFS requested clarification from BOEM regarding whether or not the eastern DPS of Steller sea lion's designated critical habitat was intended to be included in the consultation. On December 27, 2024, BOEM provided clarification that the eastern DPS of the Steller sea lion's designated critical habitat was intended to be included in the consultation.

Proposed Action and Action Area

The Energy Policy Act of 2005, Public Law 109-58 added Section 8(p)(1)(C) to the Outer Continental Shelf Lands Act (OCSLA), which grants the Secretary of the Interior the authority to issue leases, easements, or rights-of-way on the OCS for the purpose of renewable energy development (43 U.S.C. § 1337(p)(1)(C). The Department of the Interior announced the final regulations for the OCS Renewable Energy Program in April, 2009, which was authorized by the Energy Policy Act. The OCSLA, as amended, mandates the Secretary of the Interior, through BOEM, to manage the siting and development in the OCS of renewable energy facilities. BOEM is delegated the responsibility for overseeing offshore renewable energy development in Federal waters (30 C.F.R. 585). Through these regulations, BOEM oversees responsible offshore renewable energy development. As such, BOEM issued offshore wind energy leases, rights of way (ROWs) and rights of use and easements (RUEs) associated with this project.

A lease allows a lessee to submit plans for environmental data collection through site assessment and site characterization. Site assessment involves collection of meteorological (e.g., wind) and oceanographic (e.g., wave) data, typically through the temporary placement of buoys (i.e., metocean buoys) within Wind Energy Areas (WEAs). This activity involves temporary installation, operation, and decommissioning of metocean buoys. Site characterization typically includes geophysical and geotechnical surveys, collection of seafloor samples, and biological surveys conducted from a ship or autonomous underwater vehicle (AUV). BOEM reviews site characterization survey plans (survey plans), and all comments from BOEM must be resolved prior to a lessee conducting survey activities. BOEM also reviews site assessment plans (SAPs) from lessees, and lessees must have BOEM's approval of SAPs to proceed. All survey plans and SAPs are reviewed to ensure inclusion of appropriate protective measures.

Five leases were issued and became effective on June 1, 2023. ROWs and RUEs were granted, and some site characterization work (e.g., seafloor mapping by some lessees) on the project was completed under the original consultation, before BOEM reinitiated consultation with NMFS. The remaining Project work includes: (1) additional site characterization activities, and (2) site assessment activities. BOEM requested reinitiation of their previous consultation in response to changes in proposed activities now anticipated regarding the types, intensity and locations of activities. Changes proposed during site assessment and characterization now include the use of: Automated Underwater Vehicles (AUVs), Underwater Positioning Devices (UTPs), Acoustic Doppler Current Profilers (ADCPs), additional metocean buoys, additional geotechnical and benthic sampling, and additional ports for vessel traffic. These changes in proposed activities will occur within a larger action area than previously evaluated, and would overlap with additional ESA-listed species and critical habitats not analyzed in NMFS's 2022 letter of concurrence, including: sei whale, East Pacific green sea turtle DPS, olive ridley sea turtle, black abalone (and designated critical habitat), white abalone, sunflower sea star (proposed), giant manta ray, scalloped hammerhead shark, and pelagic whitetip shark (Table 7). Lessees generally have up to five years from the lease issuance date to complete these activities.

Site assessment and site characterization activities will occur in and around the Morro Bay and Humboldt WEAs and potential undersea cable routes offshore central and northern California, including transit routes to and from WEAs to any ports expected to be used by vessels conducting these activities (Figure 1). The activities are intended to collect data to support the potential future siting of offshore wind turbines, cables, and associated offshore facilities such as substations or service platforms.

Site assessment and site characterization activities collect information to determine whether sites are suitable for commercial development and inform the subsequent development of a Construction and Operations Plan (COP). Each lessee must submit a COP to be reviewed by BOEM if they intend to construct and operate a commercial-scale wind energy facility within a leased area. The COP details the design, location, construction methods, operations and mitigation measures for a wind energy facility, including cable installation and other associated components. A COP submitted to BOEM by a lessee will be considered a separate action under the National Environmental Policy Act (NEPA) that requires separate ESA and EFH consultation between NMFS and BOEM. As such, the proposed action does not include cable installation, connection to shore-based facilities, or construction and operation of wind energy facilities.

Action Area

The action area includes coastal and OCS waters from Astoria, Oregon and south to Port Hueneme, California (Figure 1; BOEM 2024a). The action area encompasses site assessment and characterization activities within the two WEAs offshore central and northern California, potential cable routes from WEAs to shore, and vessel transit routes from all potential ports (including Oregon and southern California ports) to the California WEAs (BOEM 2024a). The boundary of the Humboldt WEA begins 34 kilometers (km) offshore the city of Eureka, measures 45 km north to south and 23 km east to west, totaling approximately 535 km^2 (132,368 acres, 206 square miles). Water depths across the WEA range from approximately 500 to 1,100 meters. The Morro Bay WEA is approximately 975 km^2 (240,898 acres, 376 square miles) and located approximately 30 km (20 miles) from shore. Water depths across the WEA are approximately 900 to 1,300 m. BOEM does not have regulatory authority to approve any activities in State waters and onshore areas, or apply mitigation measures outside of the OCS.

Overview of Site Characterization and Assessment Activities

- Lessees would likely survey the entire lease area during the 5-year site assessment term (which includes 3 years of site characterization surveys and 1-5 years of buoy deployment for site assessment purposes).
- Up to six metocean buoys will be installed (per lease) during the proposed action to collect required information for the siting of potential commercial wind facilities.
- Site characterization surveys may be conducted before installation of metocean buoys, and may also be conducted after installation of buoys.
- Lessees would perform High Resolution Geophysical (HRG) surveys, which will not include the use of air guns.
- BOEM will require vessels conducting lease characterization studies, surveys, metocean buoy installation, maintenance, or decommissioning or any other survey activities to travel at speeds no more than 10 knots during all related activities including vessel transit within the action area.

Site Characterization Survey Assumptions

Site characterization activities involve geological, geotechnical, and geophysical surveys of the seafloor to ensure that mooring systems, turbines, and cables can be properly located, as well as to look for shallow hazards and for surveying archaeological (i.e., historic property) resources. Biological surveys are also part of site characterization surveys that collect data on potentially affected habitats, marine mammals, birds, sea turtles, and fishes. BOEM’s (2019) Guidelines for Information Requirements for a Renewable Energy SAP are available at http://www.boem.gov/Final-SAP-Guidelines. BOEM’s (2024) Guidelines for Providing Geophysical, Geotechnical, and Geohazard Information and other BOEM national survey guidelines for some resources can be found at http://www.boem.gov/Survey-Guidelines/.

Lessees conduct HRG surveys and geotechnical sampling within WEAs and ROW/RUE routes (i.e., the corridors from WEAs to the onshore energy grid; potential cable easement routes) during the 5-year site assessment term. It is assumed that the ROW/RUE routes would consist of a minimum 300-meter-wide corridor centered on anticipated cable locations. Because any ROW or RUE grants considered as part of this undertaking have not been issued, BOEM is uncertain of the locations of cable corridor surveys. However, BOEM anticipates power generated from

Morro Bay and Humboldt lease area(s) would need to be transmitted to shore directly from the lease area(s) by individual export cables to onshore cable landings. BOEM assumes that export cable site characterization activities would occur within a discrete corridor(s) in the region between the Morro Bay and Humboldt WEAs and shore. Surveys can be conducted before and after metocean buoy installation to collect data for a COP.

Figure 1. Map of the action area which extends north and south of the two California Wind Energy Areas (black striped polygons), which are the Humboldt WEA offshore Eureka and the Morro Bay WEA to the south (BOEM 2024a).

Collection of Geotechnical/Benthic/Sub-bottom Information Assumptions

Site characterization activities include geotechnical surveys such as dredging, gravity cores, piston cores, vibracores, deep borings, and cone penetration tests (CPT), among other geotechnical exploration methods such as benthic videography conducted with remotely operated vehicles (ROVs). Geotechnical surveys generally use active acoustic sources and may have associated low-level ancillary sounds. Samples for geotechnical evaluation are collected using shallow-bottom coring and surface sediment sampling devices taken from a small marine drilling vessel. CPTs and bore sampling are often used together because they provide different data on sediment characteristics. A CPT provides a fairly precise stratigraphy of the sampled interval, plus other geotechnical data, but does not allow for capture of undisturbed soil samples. Bore holes can provide undisturbed samples, but only when used in conjunction with CPT so that the sample depths can be pre-determined. A CPT is suitable for use in clay, silt, sand and granule-sized sediments as well as some consolidated sediment and colluvium. Bore sampling methods can be used in any sediment type and in bedrock, while vibracores are suitable for extracting continuous sediment samples from unconsolidated sand, silt, and clay-sized sediment up to 33 feet below the seafloor. Table 1 shows the estimated number of geotechnical and benthic habitat sampling sites along with the estimated area of disturbance.

Table 1. Estimated total number of geotechnical sampling sites and associated area of bottom disturbance (m^2); and number of benthic habitat sampling sites and associated area of bottom disturbance (m^2) for the Humboldt and Morro Bay lease areas.

Lease Areas	**Geotechnical Sampling Sites**	**Geotechnical Bottom Sampling Disturbance (m^2)**	**Benthic Habitat Sampling Sites**	**Benthic Habitat Sampling Bottom Disturbance (m^2)**
Morro Bay (3 leases)	4,000	46,000	10,100	23,000
Humboldt Bay (2 leases)	1,800	22,000	4,800	12,300
Total	5,800	68,000	14,900	35,300

Geotechnical sampling consists of larger boring devices using a drill ship at WTG/FOSS anchor locations. Deep borings place a frame on the seabed and use water-based drilling mud; each boring location has an estimated disturbance of 25 m^2. CPTs, piston cores, and gravity cores are also used to understand sediment structure and stability at anchor locations down to 30 m below the seafloor. In response to lessee-submitted information, the BOEM Pacific Regional Office Engineering Technical Review Section (ETRS) calculated a revised estimate for total geotechnical and benthic habitat sampling efforts necessary to support required submissions of COPs, Facility Design Reports, and Fabrication and Installation Reports. ETRS utilized the lessee information, new technical information on floating wind, and existing BOEM guidelines to develop a scenario and estimate the area of benthic disturbance that could result from surveys. For these geotechnical sampling methods, ETRS estimated a disturbance diameter of 5 m^2, which was the average disturbance submitted by the lessees.

Grab samples, box cores, or sediment profiling imagers (SPI) will likely be used for benthic habitat sampling. Grab samples and box cores have a similar bottom disturbance of around 0.5 m^2, which was used in the ETRS scenario. SPIs are cameras that insert into the substrate and take an image of the vertical profile of the material. While an individual push of the camera might cause a small seabed disturbance, a lessee informed ETRS that typically four profiles are attempted at each sampling site. ETRS used 4 m^2 as the bottom disturbance for the SPI, as it would include the four profiles taken during a single station's occupation. In addition, the RFI responses indicate that the lessees will attempt to use the SPI on most of the sampling stations, with a split of about 70% SPI and 30% grab samples/box cores.

The Morro Bay and Humboldt WEAs include multiple leases in each WEA. BOEM (2024a) estimated the number of geotechnical samples collected by all lessees will be 5,800, representing a maximum of 68,000 m^2 (6.8 ha; 16.8 acres) of seafloor disturbance (Table 1). The majority of the expected seafloor contacts are from the proposed collection of samples during surveys of benthic habitat; 14,900 samples were estimated with a seafloor disturbance size of 35,300 m^2. BOEM (2024a) indicates this estimate of benthic sampling is a worst-case scenario (i.e., maximum disturbance area ~103,300 m^2 total) based on BOEM guidance for the Atlantic Ocean (BOEM 2019) and information provided by current offshore wind energy lease holders in California.

Collection of Geophysical Information Assumptions

Site characterization will include HRG surveys for charting bathymetry, archaeological resources, and benthic zone hazards (following BOEM's guidelines for geophysical data requirements: 30 CFR 585.610(b)(2) and 30 CFR 585.610(b)(3)). HRG surveys can inform site selection for geotechnical sampling and whether hazards will interfere with future construction phases.

HRG surveys use electrically-induced sonar transducers to emit and record acoustic pulses, and do not use air or water compression to generate sound. HRG survey equipment may include swath bathymetry systems, magnetometers/gradiometers, side-scan sonar, multibeam echosounders, shallow penetrating seismic sub-bottom profiler systems, and medium penetrating impulsive seismic systems such as boomers or sparkers (Table 2). This equipment does not contact the seafloor and is expected to be towed from a moving survey vessel or onboard unmanned vehicles (e.g., ROVs, AUVs), or Human Occupied Vehicles (HOVs, i.e., submersibles).

Improved HRG survey technologies that may become available must meet requirements for SAPs (30 CFR § 585.606(5)). If new technology is proposed by lessees for site characterization or SAPs, and if the potential impacts from this new technology are the same or less than those analyzed for the equipment described in this document, BOEM may approve the survey plans without reinitiating consultation.

The line spacing guidelines for HRG surveys described in BOEM (2024) vary depending on the survey goal. To collect geophysical data for shallow hazards assessments (including multibeam echosounder, side-scan sonar, and sub-bottom profiler systems), BOEM recommends surveying at a 150-m (492-ft) primary line spacing and a 500-m (1,640-ft) tie-line spacing over the proposed lease area. For the collection of geophysical data for archaeological resources assessments (including magnetometer, multibeam echosounder, side-scan sonar, and sub-bottom profiler systems), BOEM recommends surveying at a 30-m (98-ft) primary line spacing and a 500-m (1640-ft) tie-line spacing over potential pre-contact archaeological sites once part of the terrestrial landscape that has since inundated by global sea level rise during the Pleistocene and Holocene; generally thought to be in waters less than 100 m depth, which is typically in cable landing areas.

Several survey methods can be used to collect high resolution geophysical data, as summarized below. Typically, these methods are based on the water depth of the survey area. However, limitations on equipment availability may affect which survey methods are chosen.

- AUVs are autonomous (non-tethered) submersibles with their own power supply and basic navigation logic. An AUV can run many geophysical sensors at once and typically would consist of a multibeam echosounder, side-scan sonar, magnetometer, and a sub-bottom profiler. AUVs also have forward looking sonar for terrain avoidance, a doppler velocity logger for velocity information, an internal navigation system for positioning, an ultra-short baseline pinger for positioning, and an acoustic modem for communication with a surface survey vessel. For single AUV operations the surface survey vessel follows the AUV, keeps in communication via the acoustic modem, provides navigation information to the AUV, and monitors the health of the AUV. During multiple AUV surveys, several AUVs are deployed at once. These AUVs run independently from the survey vessel. Navigation updates and modem communication are provided by a network of UTPs. These transponders are deployed to the seabed in known locations. In both methods of operation, the survey vessel recovers, maintains, and launches the AUVs and UTPs (see also BOEM 2024a). A survey vessel may deploy AUVs and UTPs through a moon pool, which is a large opening through the hull from the deck and to the bottom of a vessel for lowering tools and instruments into the sea.

- Towed surveys include a vessel towing underwater instruments. Towed instrumentation may include side-scan sonar, passive acoustic, seismic, magnetometers and/or gradiometers with winches to provide altitude adjustments. In shallower water, the survey vessel usually has hull mounted multibeam echosounders, a sub-bottom profiler, and an ultra-short baseline system. In deeper water, the vessel may tow survey instruments at depth with a large weight (depressor) followed by a side-scan sonar, sub-bottom profiler, and potentially a multibeam echosounder. In deep waters, the survey vehicle might be 8–10 km behind the survey vessel, sometimes requiring the use of a chase vessel to provide USBL navigation for the survey vehicle. Vessels maintain slower speeds of 0–4.5 knots when towing equipment.

- Uncrewed Surface Vessels (USV) are remote controlled vessels that are controlled by operators on shore or from another vessel. USVs can be simple with a single instrument, designed for shallow waters, and controlled by an operator that maintains visual contact with the USV. USVs can also be larger, the size of a small survey vessel, are operated over the horizon, could tow instruments, and use radar and cameras to operate safely and monitor for protected species. USVs can be electrically powered with batteries, sail/solar powered, and/or use diesel motors and generators.

Table 2. HRG survey equipment that could be used during geophysical surveys for site characterization (BOEM 2024a).

Equipment Type	Data Collection and/or Survey Types	Description of the Equipment
Bathymetry/depth sounder (multibeam echosounder)	Collection of geophysical data for shallow hazards, archaeological resources, benthic habitats, and bathymetric charting	A depth sounder is a microprocessor-controlled, high-resolution survey-grade system that measures precise water depths in both digital and graphic formats. The system would be used in such a manner as to record with a sweep appropriate to the range of water depths expected in the survey area. This Project assumes the use of multibeam bathymetry systems, which may be more appropriate than other tools for characterizing those lease areas containing complex bathymetric features or sensitive benthic habitats such as hardbottom areas.

Equipment Type	Data Collection and/or Survey Types	Description of the Equipment
Magnetometer	Collection of geophysical data for shallow hazards and archaeological resources assessments	Magnetometer surveys would be used to detect and aid in the identification of ferrous or other objects having a distinct magnetic signature. The magnetometer sensor is typically towed as near as possible to the seafloor and anticipated to be no more than approximately 6 m (20 ft) above the seafloor. This methodology will not be used in the WEA since depths are 500 m or greater, but will be used to survey potential cable routes that will occur in depths shallower than 500 m.
Side-scan sonar	Collection of geophysical data for shallow hazards and archaeological resource assessments	This survey technique is used to evaluate surface sediments, seafloor morphology, and potential surface obstructions (MMS 2007). A typical side-scan sonar system consists of a top-side processor, tow cable, and towfish with transducers (or "pingers") located on the sides which generate and record the returning sound that travels through the water column at a known speed. BOEM assumes that the lessee would use a digital dual-frequency side-scan sonar system with 300–500 kHz frequency ranges or greater to record continuous planimetric images of the seafloor.
Shallow and medium penetration sub-bottom profilers	Collection of geophysical data for shallow hazards and archaeological resource assessments and to characterize subsurface sediments	Typically, a high-resolution CHIRP System sub-bottom profiler is used to generate a profile view below the bottom of the seabed, which is interpreted to develop a geologic cross-section of subsurface sediment conditions under the track line surveyed. Another type of sub-bottom profiler that may be employed is a medium penetration system such as a boomer, bubble pulser or impulse-type system. Sub-bottom profilers are capable of penetrating sediment depth ranges of 3 m (10 ft) to greater than 100 m (328 ft), depending on frequency and bottom composition.

<u>Biological Survey Assumptions</u>

Site characterization surveys for animals (birds, bats, marine mammals, sea turtles, fishes, and invertebrates) may involve visual observations from vessels or from the air and technologies to detect animals. Biological resource surveys (30 CFR 585.610(b)(5)) for birds, fishes, marine mammals, and sea turtles from vessels are typically done during daylight hours, with day trips lasting about 10 hours. These surveys may occur at the same time from the same vessel, but not concurrently with HRG surveys. Benthic habitat survey trips are assumed to be 24-hr operations.

Site Assessment Assumptions

Instrumentation and Power Requirements

Metocean buoys are anchored at fixed locations to monitor and evaluate the viability of wind as an energy source. These buoys may include floating light detection and ranging (LiDAR) to measure wind speeds at multiple heights, and anemometers, vanes, barometers, temperature transmitters and other devices may be mounted on a buoy. A metocean buoy could also accommodate environmental monitoring equipment such as avian monitoring equipment including thermal imaging cameras, tagging receivers, acoustic monitoring for marine mammals, data logging computers, visibility sensors, water measurements including temperature, and communications equipment. Onboard power supply sources for buoys may include solar arrays, lithium or lead-acid batteries, and diesel generators, which require an onboard fuel storage container with appropriate spill protection and an environmentally sound method to perform refueling activities.

The speed and direction of ocean currents will likely be assessed with ADCPs. ADCPs are a remote sensing technology that transmits sound waves at a constant frequency and measures the ricochet of the sound wave off fine particles or zooplanktons suspended in the water column. A typical ADCP has 3 to 4 acoustic transducers that emit and receive acoustical pulses from different directions, with frequencies ranging from 300-600 kHz and a sampling rate of every one to 60 minutes.

Metocean Buoy and ADCP Designs and Anchoring Systems

Discus-shaped, boat-shaped, and spar buoys (Figure 3 in BOEM 2024a) are the buoy types that would most likely be adapted for offshore wind data collection. Mooring depends on hull type, location, and water depth (National Data Buoy Center 2012). On the OCS, a larger discus-type or boat-shaped hull buoy mooring may require a combination of a chain, nylon, and buoyant polypropylene materials designed with one or two weights. Moorings will be designed to minimize or remove entanglement risk for protected species. In 2020, Pacific Northwest National Laboratory (PNNL) installed two LiDAR buoys off California that had a boat-shaped hull moored with a solid cast iron anchor weighing approximately 4,990 kg (11,000 lbs.) with a 2.3 m^2 footprint. The mooring line consisted of chain, jacketed wire, nylon rope, polypropylene rope and subsurface floats to keep the mooring line taut to semi-taut. The mooring line was approximately 1,200 m long in the Humboldt WEA (PNNL 2019). BOEM anticipates that LiDAR buoys deployed as part of the proposed action will be very similar to these LiDAR buoys deployed by PNNL.

The ADCPs may be mounted independently on the seafloor, attached to a buoy, or have multiple instruments deployed as a subsea current mooring. A seafloor mounted ADCP would likely be located near a metocean buoy. A subsea current mooring might have 8–10 ADCPs vertically suspended from an anchor combined with several floats made of syntactic foam; these moorings do not breach the surface. A typical ADCP is about one to two feet high and one to two feet wide. Its mooring, base, or cage (surrounding frame) will be several feet wider. Based on information from existing West Coast lessees, BOEM anticipates up to three ADCP moorings could be installed in each lease area, and up to seven may be installed along the export cable routes.

Additional seafloor disturbance per lease could come from anchoring for up to 6 metocean buoys and up to 10 ADCP moorings per lease, for a total of 16 contacts from anchors per lease. Each anchoring event is expected to be no more than 10 $m^{2,}$ for a total of 160 m^2 of benthic disturbance per lease (or 800 m^2 for five leases). BOEM (2024a) estimated seafloor disturbance from UTPs, or similar technology as a maximum of 64 m^2 per lease (320 m^2 for all five leases) . Based on these contact numbers, BOEM estimated 224 m^2 sediment disturbance per lease caused by anchoring metocean buoys, ADCP's, and UTPs, for a total of 1,120 m^2 of benthic disturbance for five leases caused by anchoring.

<u>Buoy Installation, Operations and Maintenance, and Decommissioning Assumptions</u>
Buoys are typically towed or carried aboard a vessel to the installation location. The buoy is then lowered to the ocean from the deck of the transport vessel or placed over the final location and the mooring anchor dropped. The buoy is anchored to the seafloor with a solid cast iron anchor weighing approximately 11,000 lb (2.3 m^2 footprint). The mooring line is composed of various components and materials, including chain, jacketed wire, nylon rope, polypropylene rope, and subsurface floats to keep the mooring line taut to semi-taut, reduce slack, and eliminate looping. After installation, the transport vessel would likely remain in the area for several hours while technicians configure proper operation of all systems (PNNL 2019). Metocean buoy installation will take approximately one day (BOEM 2024a).

Monitoring information transmitted to shore would include systems performance information such as battery levels and charging systems output, the operational status of navigation lighting, and buoy positions. Additionally, all data gathered via sensors would be fed to an onboard radio system that transmits the data string to a receiver onshore (Tetra Tech EC Inc. 2010). On-site inspections and preventative maintenance (e.g., marine fouling, wear, or lens cleaning) are expected to occur yearly. Decommissioning is expected to be completed within one day per buoy equipment recovery in year 6 or 7 after lease issuance (≤ 5 years of total deployment). A vessel(s) equivalent in size and capability to the vessel used for installation would be used for decommissioning (BOEM 2024a).

Vessel Characterization and Traffic Assumptions

Vessel trips are anticipated for both site assessment and site characterization activities (Tables 3-5). BOEM (2024a) assumes vessel traffic from 2017 is a reasonable level of activity to assess normal traffic patterns by vessels transiting the areas through and near the two WEAs for comparison to the anticipated added vessel trips associated with the proposed action. Traffic patterns based on 2017 Automatic Identification System (AIS) data are more concentrated further to sea and closer to shore than in the Morro Bay and Humboldt WEAs (Figure 2). Tug and tow vessels do traverse the Morro Bay and Humboldt WEAs; however, they are concentrated in the nearshore tow lane and further offshore. Cargo ships also traverse the WEAs, but use is concentrated further offshore. Tankers did not traverse the WEAs in 2017.

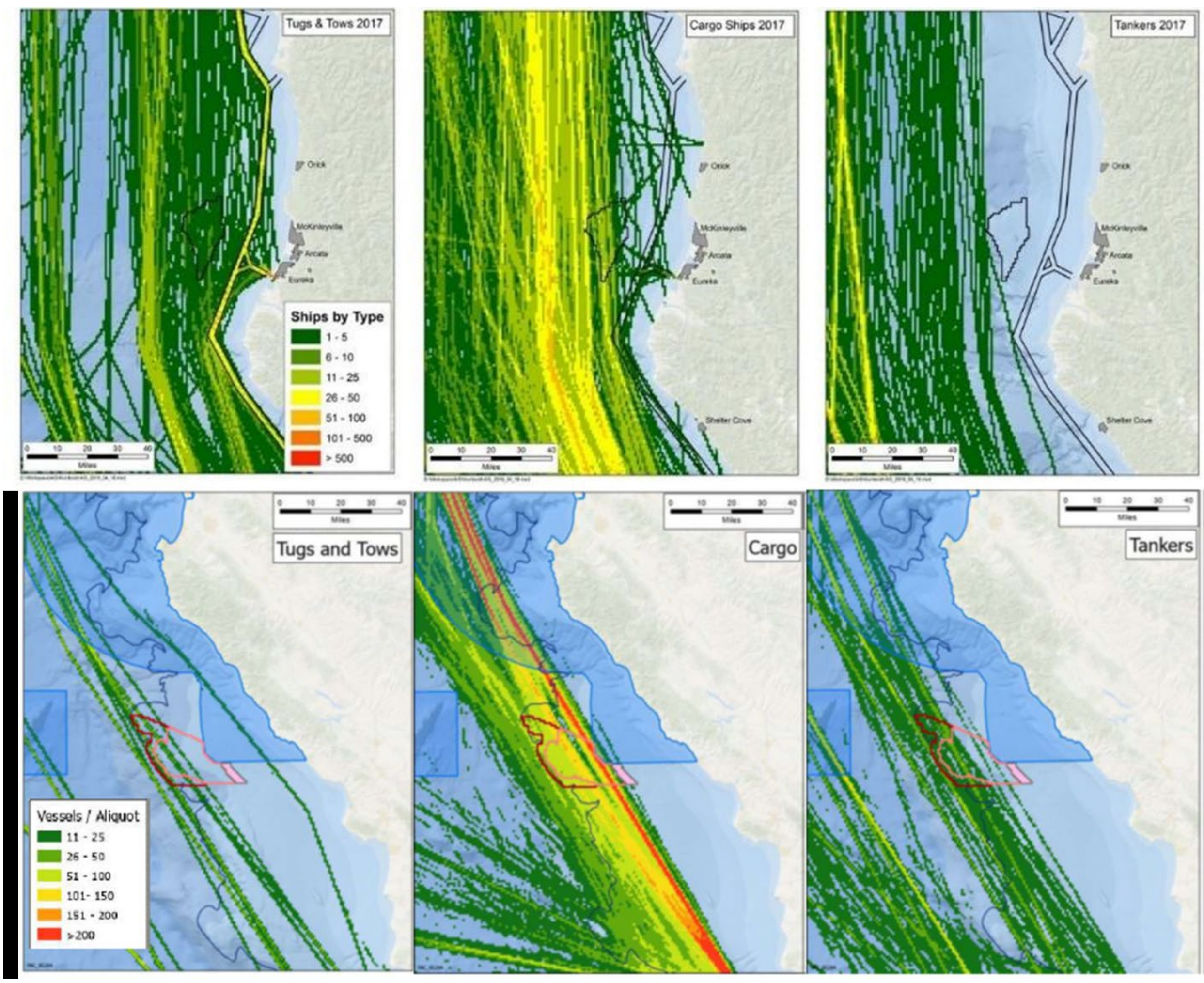

Figure 2. AIS-derived vessel traffic From 2017 for tugs and tows, cargo ships, and tankers in and near the Humboldt (top) and Morro Bay (bottom) Wind Energy Areas.

Table 3. Projected maximum vessel trips for buoy activities over a 5-year period, based on each lease having up to six buoys. Per-lease trips were multiplied by 2 to represent estimates for two Humboldt leases, by 3 to represent three Morro Bay leases, and by 5 to provide an estimated upper limit across all leases. (BOEM 2024a).

Site Assessment Activity	# Round Trips for 1 Lease	# Round Trips for 2 Leases	# Round Trips for 3 Leases	# Round Trips for 5 Leases
Buoy installation	6	12	18	30
Buoy yearly maintenance at once per year per buoy for 5 years	30	60	90	150
Metocean buoy decommissioning (may occur after year 5)	6	12	18	30
Additional trips for maintenance, as needed (e.g., severe weather)	60	120	180	300
Total round trips	102	144	186	510

Table 4. Projected maximum vessel trips in the action area for site characterization for days at sea (DAS) and port round trips for geophysical (HRG) surveys and geotechnical sampling.

HRG Surveys and Geotechnical Sampling	1 Lease	2 Leases	3 Leases	5 Leases
# Days at Sea (DAS), assuming 2 years of operations per lease	730	1,460	2,190	3,650
# Round trips to ports, estimated for 2 years of operations per lease	50	100	150	250

Table 5. Projected maximum vessel trips in the action area for site characterization for day trips for biological resources. Per-lease trips were multiplied by 2 to represent estimates for two Humboldt leases, by 3 to represent three Morro Bay leases, and by 5 to provide an estimated upper limit across all leases (although vessel numbers are unlikely to scale with number of leases). Avian surveys are likely to be conducted on the same vessel trips as mammal and turtle surveys, but these surveys are counted separately here.

Biological Resource Surveys (often 10 hour trips)	1 Lease	2 Leases	3 Leases	5 Leases
Avian Surveys	30-60	120	180	300
Marine Mammals, Sea Turtles	30-60	120	180	300
Fish Surveys	8-370	740	1,110	1,850
Total Estimated # of Trips	68-490	980	1,470	2,450

Project Design Criteria (PDC) and Best Management Practices (BMPs)

BOEM has developed project design criteria (PDC) and best management practices (BMPs) for site assessment and site characterization activities (Table 6). BOEM developed PDCs to avoid and minimize potential environmental risks to or conflicts with protected resources from activities that are part of the proposed action. Through coordination with stakeholders, BOEM developed BMPs for implementation of PDCs.

Mechanisms for implementing BMPs include lease stipulations, individual plan reviews, and incidental take authorization requirements for marine mammals (including ESA-listed species) under the Marine Mammal Protection Act. BOEM will ensure implementation of BMPs through review of SAPs and survey plans through standard operating conditions (SOCs). BOEM's project-specific reviews may result in additional BMPs to clarify these conditions, or to further minimize and avoid impacts to threatened or endangered species or their habitats. If changes to existing BMPs or PDCs are proposed, BOEM should contact NMFS to determine whether reinitiation of consultation is needed. Appendix A of BOEM (2024a) includes the specific PDCs and BMPs intended to minimize effects to ESA-listed species and EFH for site characterization and assessment activities to support offshore wind development. We have condensed them in Table 6, as they are considered part of the proposed action and will be used to assess effects to ESA-listed species and EFH.

Table 6. BOEM's proposed PDCs for protected species and EFH. These PDCs are in addition to existing statutory and regulatory requirements, review procedures, and other BMPs that may apply. These measures are summarized here and can be referenced in full in Appendix A (BOEM 2024a).

#	Project Design Criteria	Applicable to	Purpose
1	Hard Bottom Avoidance: Metocean Buoy Anchoring Plan	Employees and all at-sea contract personnel and vessels	Metocean Buoy Anchoring: To protect rocky reefs, a Habitat of Particular Concern for Pacific Groundfish EFH, which will reduce adverse effects associated with habitat alteration to minimally adverse levels.
2	Marine Debris Awareness and Elimination	All at-sea and dockside operations	To provide informational training to all employees and contract personnel on the proper storage and disposal practices at-sea to reduce the likelihood of accidental discharge of marine debris that can impact protected species through entanglement or incidental ingestion.
3	HRG Survey Vessel Constraints	Any survey vessel operating high-resolution geophysical survey equipment to obtain data associated with a lease and operating such equipment at or below 180 kHz	This PDC will avoid injury of ESA-listed species and minimize the likelihood of adverse effects associated with potential disturbance to discountable levels through the establishment of pre-clearance, exclusion zones, shut-downs, protected species observer (PSO) monitoring, and other BMPs to avoid and reduce exposure of ESA-listed species to underwater survey noise.
4	Minimize Vessel Interactions with ESA-listed species	All vessels	To avoid injuring or disturbing ESA-listed species by establishing minimum separation distances between vessels and marine protected species; and operational protocols for vessels when animals are sighted.
5	Entanglement Avoidance	Mooring and anchoring systems for buoys and metocean data collection devices.	To use the best available mooring systems using anchors, chain, cable, or coated rope systems that prevent or reduce to discountable levels any potential entanglement of marine mammals and sea turtles.
6	Protected Species Observers	Geophysical Surveys	To require PSO training; to require PSO approval requirements by NMFS prior to deployment on a project.

#	Project Design Criteria	Applicable to	Purpose
7	Reporting Requirements	PSOs and any project-related personnel who observe a dead and/or injured protected species.	To document and record monitoring requirements for geophysical surveys, project-related incidents involving ESA-listed species, and to report any impacts to protected species in a project area whether or not the impact is related to the project.
8	Prohibition of Trawling for Biological Surveys	Employees and all at-sea contract personnel and vessels	To reduce the possibility of bycatch of protected fish species and to protect benthic habitats.

Other Activities

We considered, under the ESA, whether or not the proposed action would cause any other activities, and determined that it could cause the following activities: marine technology companies or organizations may install meteorological buoys or instrumentation near the WEAs to collect information that could be later sold to lessees; and biological consulting firms or organizations may conduct biological surveys that may utilize moored instrumentation. We are aware that private companies have installed instrumentation near the WEAs for subsequent sales of data later. However, very little information is available on these activities, and the extent of these activities that have occurred is uncertain. We acknowledge that many of these potential activities are similar to the actions evaluated in this consultation (and correspondingly, so would most of the potential effects), including deployment and anchoring of instruments on the seafloor (in particular metocean buoys), and that these effects are described in the entanglement, benthic disturbance, and vessel collisions sections in this consultation. Generally, we do assume similar effects to those evaluated in this consultation are possible. However, although these activities are highly uncertain as to their precise scope and location, we anticipate the activities would be similar in nature to those activities described in the proposed action, and we do not believe they would alter the overall effects conclusions. If these induced activities were to occur, they would likely be subject to the United States Army Corps of Engineers (Corps) jurisdiction under the Clean Water Act, or Rivers and Harbors Act, and therefore would not be able to affect ESA-listed species or designated critical habitats without undergoing ESA consultation.

Background and Action Agency's Effects Determination

BOEM has evaluated what effects survey and data collection activities associated with offshore renewable energy leasing may have on ESA-listed species of whales, sea turtles, fish, invertebrates and their critical habitats. Additionally, BOEM has evaluated what effects to EFH are associated with the proposed action and has consolidated their analysis with the ESA consultation. BOEM's BA and EFH assessment (BOEM 2024a) describes the proposed action, identifies those threatened and endangered species (Table 8), designated critical habitats, species proposed for ESA-listing, and essential fish habitat, likely to be affected by the action, identifies potential impact-producing factors, and analyzes potential effects, including cumulative effects.

BOEM has determined that the proposed action is not likely to adversely affect any ESA-listed species or designated critical habitat, or species proposed for ESA listing.

Table 7. ESA-listed species, their stock or ESU/DPS, their scientific names, ESA listing status, and critical habitat designation for those species or critical habitats that may be affected by the proposed action. NA indicates critical habitat has not been designated, and Yes or No indicates whether the action overlaps critical habitat (CH).

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	CH Designations	CH Overlap
Marine Mammals - 10 species					
Blue whale *Balaenoptera musculus*	Eastern North Pacific	Endangered	35 FR 18319; December 2, 1970. 2020 Recovery plan	NA	NA
Fin whale *Balaenoptera physalus*	California, Oregon, Washington	Endangered	35 FR 8491; June 2, 1970. 2010 Recovery plan	NA	NA
Sei whale *Balaenoptera borealis*	Eastern North Pacific	Endangered	35 FR 12024; December 2, 1970. 2011 Recovery plan	NA	NA
Humpback whale *Megaptera novaeangliae*	Central America DPS	Endangered	81 FR 62260; September 8, 2016. 1991 Recovery plan	86 FR 21082, April 21, 2021	Yes
Humpback whale *Megaptera novaeangliae*	Mexico DPS	Threatened	81 FR 62260; September 8, 2016. 1991 Recovery plan	86 FR 21082, April 21, 2021	Yes
Gray whale *Eschrichtius robustus*	Western North Pacific DPS	Endangered	59 FR 31094, June 16, 1994	NA	NA
Sperm whale *Physeter macrocephalus*	California, Oregon, Washington	Endangered	35 FR 18319; December 2, 1970. 2010 Recovery plan	NA	NA

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	CH Designations	CH Overlap
Killer whale *Orcinus orca*	Eastern North Pacific Southern Resident	Endangered	79 FR 20802; April 14, 2014. 2008 Recovery Plan	86 FR 14668, August 2, 2021	Yes
Guadalupe fur seal *Arctocephalus townsendi*	Throughout range	Threatened	50 FR 51252; December 16, 1985	NA	NA
Steller sea lion *Eumetopias jubatus*	Eastern DPS	Delisted (but critical habitat still in effect)	N/A	50 CFR 226.206	Yes
Sea Turtles - 5 species					
Leatherback sea turtle *Dermochelys coriacea*	Throughout range	Endangered	35 FR 8491; June 3, 1970. 1998 Recovery Plan	77 FR 4169, January 26, 2012	Yes
Loggerhead sea turtle *Caretta*	North Pacific Ocean DPS	Endangered	76 FR 58868; October 24, 2011. 1997 Recovery Plan	NA	NA
Green sea turtle *Chelonia mydas*	East Pacific DPS	Threatened	81 FR 20057; May 6, 2016. Recovery Plan	Proposed 88 FR 46572, July 19, 2023	NA
Olive ridley sea turtle *Lepidochelys olivacea*	Mexico's Pacific Coast breeding population	Endangered	43 FR 32800; August 27, 1978. 1998 Recovery Plan	NA	NA
Olive ridley sea turtle *Lepidochelys olivacea*	All other populations	Threatened	43 FR 32800; August 27, 1978. 1998 Recovery Plan	NA	NA
Salmonids - 26 ESUs or DPSs					
Chinook salmon *Oncorhynchus tshawytscha*	Sacramento River winter run ESU	Endangered	59 FR 440, January 4, 1994 (50 CFR § 224.101)	58 FR 33212, June 16, 1993 (50 CFR § 226.204)	Yes
Chinook salmon *Oncorhynchus tshawytscha*	Upper Columbia River spring-run ESU	Endangered	79 FR 20802, April 14, 2014 (50 CFR § 224.101)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	CH Designations	CH Overlap
Chinook salmon *Oncorhynchus tshawytscha*	California coastal ESU	Threatened	70 FR 37159, April 14, 2014 (50 CFR § 223.102)	70 FR 52488, September 2, 2005 (50 CFR § 226.211)	Yes
Chinook salmon *Oncorhynchus tshawytscha*	Central Valley spring-run ESU	Threatened	70 FR 37159, June 28, 2005 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.211)	No
Chinook salmon *Oncorhynchus tshawytscha*	Lower Columbia River ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes
Chinook salmon *Oncorhynchus tshawytscha*	Puget Sound ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	No
Chinook salmon *Oncorhynchus tshawytscha*	Snake River fall-run ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	58 FR 68543, December 28, 1993 (50 CFR § 226.205)	Yes
Chinook salmon *Oncorhynchus tshawytscha*	Snake River spring/ summer-run ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	64 FR 57399, October 25, 1999 (50 CFR § 226.205)	Yes
Chinook salmon *Oncorhynchus tshawytscha*	Upper Willamette River ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes
Chum salmon *Oncorhynchus keta*	Columbia River ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes
Chum salmon *Oncorhynchus keta*	Hood Canal summer-run ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	No
Coho salmon *Oncorhynchus kisutch*	Central California Coast ESU	Endangered	79 FR 20802, April 14, 2014 (50 CFR § 224.101)	64 FR 24049, May 5, 1999 (50 CFR § 226.210)	No

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	CH Designations	CH Overlap
Coho salmon *Oncorhynchus kisutch*	Lower Columbia River ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	81 FR 9251, February 24, 2016 (50 CFR § 226.212)	Yes
Coho salmon *Oncorhynchus kisutch*	Oregon coast ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	73 FR 7815, February 11, 2008 (50 CFR § 226.212)	Yes
Coho salmon *Oncorhynchus kisutch*	Southern Oregon & Northern California coasts ESU	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	64 FR 24049, May 5, 1999 (50 CFR § 226.210)	Yes
Steelhead trout *Oncorhynchus mykiss*	Southern California DPS	Endangered	79 FR 20802, April 14, 2014 (50 CFR § 224.101)	70 FR 52536, September 2, 2005 (50 CFR § 226.211)	Yes
Steelhead trout *Oncorhynchus mykiss*	California Central Valley DPS	Threatened	71 FR 834, January 5, 2006 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.211)	No
Steelhead trout *Oncorhynchus mykiss*	Central California Coast DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52488, September 2, 2005 (50 CFR § 226.211)	No
Steelhead trout *Oncorhynchus mykiss*	Lower Columbia River DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes
Steelhead trout *Oncorhynchus mykiss*	Middle Columbia River DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes
Steelhead trout *Oncorhynchus mykiss*	Northern California DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.211)	Yes
Steelhead trout *Oncorhynchus mykiss*	Puget Sound DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	81 FR 9252, February 24, 2016 (50 CFR § 226.212)	No
Steelhead trout *Oncorhynchus mykiss*	Snake River DPS	Threatened	79 FR 20802; April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	CH Designations	CH Overlap
Steelhead trout *Oncorhynchus mykiss*	South-Central California Coast DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52488, September 2, 2005 (50 CFR § 226.211)	Yes
Steelhead trout *Oncorhynchus mykiss*	Upper Columbia River DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes
Steelhead trout *Oncorhynchus mykiss*	Upper Williamette River DPS	Threatened	79 FR 20802, April 14, 2014 (50 CFR § 223.102)	70 FR 52630, September 2, 2005 (50 CFR § 226.212)	Yes
Non-salmonid Fishes - 5 species					
Scalloped hammerhead shark *Sphyrna lewini*	Eastern Pacific DPS	Endangered	79 FR 38214, July 3, 2014 (50 CFR § 224.101)	NA	NA
Green sturgeon *Acipenser medirostris*	Southern DPS	Threatened	71 FR 17757, April 7, 2006 (50 CFR § 223.102)	74 FR 52300, October 9, 2009 (50 CFR § 226.219)	Yes
Oceanic whitetip shark *Carcharhinus longimanus*	Throughout range	Threatened	83 FR 4153, January 30, 2018 (50 CFR § 223.102)	NA	NA
Giant manta ray *Mobula birostris*	Throughout range	Threatened	83 FR 2916, January 22, 2018 (50 CFR § 223.102)	NA	NA
Eulachon *Thaleichthys pacificus*	Southern DPS	Threatened	75 FR 13012, March 18, 2010 (50 CFR § 223.102)	76 FR 65324, October 20, 2011 (50 CFR § 226.222)	No
Invertebrates - 3 species					
Black abalone *Haliotis cracherodii*	Throughout range	Endangered	74 FR 1937, January 14, 2009 (50 CFR § 224.101)	76 FR 66806, October 27, 2011 (50 CFR § 226.221)	Yes

Common Name	Stock or ESU/DPS	ESA Status	Citations for ESA Listing	CH Designations	CH Overlap
White abalone *Haliotis sorenseni*	Throughout range	Endangered	66 FR 29046, May 29, 2001 (50 CFR § 224.101)	NA	NA
Sunflower sea star *Pycnopodia helianthoides*	NA	Proposed Threatened	Proposed 88 FR 16212, March 16, 2024	NA	NA

Life History and use of the Action Area by Listed Species

<u>Marine Mammals</u>
Large whales that may be found within the action area that may be affected by the proposed action include blue whales, fin whales, sei whales, two DPSs of humpback whales, Western North Pacific gray whales, sperm whales, and Southern Resident killer whales. Calambokidis et al. (2024) integrated data from visual sightings, tagged animals, and habitat-based density models to update (originally published in Calambokidis et al. 2015 for several large whale species) and delineate new Biologically Important Areas (BIAs) for cetaceans along the U.S. West Coast. A BIA is an area and time of year that is important to cetacean feeding, reproduction, or migration. Except for gray whales, each defined BIA is composed of a larger "parent BIA" within which an area of more intensive use, termed a "core BIA" is also delineated.

The Eastern North Pacific Stock of blue whales ranges from the northern Gulf of Alaska to the eastern tropical Pacific (Carretta et al. 2022). Calambokidis et al. (2024) defined a parent BIA for blue whales from June to November that extends from the Southern California Bight to waters off the coast of Florence, Oregon. This area overlaps much of the action area, including the entirety of both the Morro Bay and Humboldt WEAs. The parent BIA covers 98% of documented sightings of blue whale feeding, and 87% of the area used by tagged blue whales. The more intensively used core BIA for blue whales makes up only 30% of the parent BIA, but accounts for 73% of documented feeding sightings and 50% of the area used by tagged blue whales. The core BIA includes much of the action area from the southern boundary off Port Hueneme to the Oregon border, including all of the Morro Bay WEA and a majority of the Humboldt WEA.

NMFS expects that most of this stock migrates south to spend the winter and spring in high productivity areas off Baja California, in the Gulf of California, and on the Costa Rica Dome. Therefore, we would anticipate that during the summer and late fall, blue whales may occur within the action area.

Based on updated photographic identification data through 2018 using mark-recapture methods, Calambokidis and Barlow (2020) estimated the current blue whale abundance for the U.S. West Coast feeding component of the Eastern North Pacific stock at 1,898 whales. This is considered the best estimate, as summarized in the final 2022 Stock Assessment Report (SAR) (Carretta et al. 2023a). With a minimum population size of approximately 1,767 blue whales, and an approximate annual rate of increase of 4%, the potential biological removal (PBR[1]) allocation for U.S. waters is 4.1 whales per year (Carretta et al. 2023a).

The North Pacific population of fin whales summers from the Chukchi Sea to California and winters from California southward, although less is known about their wintering areas. Fin whales occur year-round off California, Oregon, and Washington in the California Current, with aggregations in southern and central California (Carretta et al. 2023a). While long-range movements along the U.S. West Coast have been documented, not all fin whales undergo such long migrations. As documented by photo identification studies, fin whales undertake short-range seasonal movements in the spring and fall. Fin whales are commonly associated with the continental slope (Schorr et al. 2010). Fin whales feed on planktonic crustaceans, including *Thysanoessa sp*. euphausiids and *Calanus sp*. copepods, and schooling fish, including herring, capelin and mackerel (Aguilar 2009).

Calambokidis et al. (2024) defined a BIA for fin whales from June to November, with the parent BIA extending from the Southern California Bight to offshore waters of northern California, Oregon, and Washington. The parent BIA overlaps the action area from its southern extent off Port Hueneme to waters off Fort Bragg, and a discontinuous patch off the Oregon-California border. The parent BIA includes all of the Morro Bay WEA, but does not overlap the Humboldt WEA. About 95% of documented feeding sightings occurred within the parent BIA, which accounts for 89% of the area used by tagged fin whales. The more intensively used core BIA accounts for 74% of documented sightings of fin whale feeding, and 61% of the area used by tagged whales. The fin whale core BIA overlaps the entirety of the Morro Bay WEA, but does not include the Humboldt WEA.

The best estimate of fin whale abundance in California, Oregon, and Washington waters out to 300 nm is 11,065 whales, using species distribution models generated from fixed and dynamic ocean variables from 1991 through 2018. Using this abundance estimate, the minimum population estimate is 7,970 whales, with a calculated PBR of 80 whales per year. The

[1] The Potential Biological Removal level is a reference point defined by the Marine Mammal Protection Act. It is the maximum number of animals, not including natural deaths, that may be removed annually from a marine mammal stock (i.e., population) while allowing the population to maintain or recover to its optimum sustainable population size.

population off the U.S. West Coast has been increasing an average of 7.5 percent per year based on data from 1991 to 2014 (Carretta et al. 2023a).

Sei whales occur worldwide across all major ocean basins. They are mainly distributed in temperate offshore waters, but do occur in polar and tropical regions. Line-transect surveys of the central and eastern North Pacific west of 135°W longitude estimated sei whale abundance at 29,632 animals (Hakamada et al. 2017). Sightings of this species along the U.S. West Coast are rare. The two most recent line transect surveys of California, Oregon, and Washington waters estimated the abundance of sei whales at 311 in 2008, and 864 in 2014. The best estimate of abundance in this region is the unweighted geometric mean of these estimates, 519 sei whales (Barlow 2016). This species is listed as endangered under the ESA, and consequently the eastern North Pacific stock is also considered a depleted and strategic stock under the MMPA.

Humpback whales are found in all oceans of the world and migrate from high latitude feeding grounds to low latitude calving areas. They primarily occur near the edge of the continental slope and deep submarine canyons, where upwelling concentrates zooplankton near the surface for feeding. They are most abundant off the U.S. West Coast from spring through fall, with most animals migrating to lower latitude breeding areas located primarily off Mexico and Central America in the winter (Calambokidis et al. 2000).

Within the action area, the two humpback whale DPSs that forage off California, Oregon and Washington include the endangered Central America DPS and the threatened Mexico DPS. There is some mixing between these populations on the foraging grounds although they are still considered distinct populations. However, when the DPSs were designated, the MMPA stock assessments for humpback whales were not aligned with the identified ESA DPSs (i.e., some stocks were composed of whales from more than one DPS) which led NMFS to reevaluate stock structure under the MMPA. The recent reevaluation resulted in the delineation of demographically independent populations (DIP) as well as “units” that may contain one or more DIPs, where demographic independence is defined as “…the population dynamics of the affected group is more a consequence of births and deaths within the group (internal dynamics) rather than immigration or emigration (external dynamics)” (Carretta et al. 2023a). From these DIPs and units, NMFS designated five new humpback whale stocks in the North Pacific, two of which may be present in the action area: the “Central America/Southern Mexico-CA-OR-WA” stock (from the Central America DPS), and “Mainland Mexico/CA-OR-WA” stock (from the Mexico DPS) (Carretta et al. 2023a). The Central America DIP’s wintering ground is understood to extend into southern Mexico, and therefore we consider the inclusion of southern Mexico humpbacks and the abundance estimate recently published by Curtis et al. (2022), using photo-identification data collected in their wintering area from 2019 to 2021, as effectively representing the Central America DPS population. However, NMFS will continue to evaluate the relationship between the humpback whale DPSs and recognized DIPs moving forward.

The proportion of humpbacks that migrate to the main breeding grounds varies by latitude. For example, it is estimated that most Central America DPS whales use California and Oregon waters for feeding, while the Mexico DPS feeds off the entire U.S. West Coast as well as British Columbia and Alaska (Wade 2021). Humpback whales often feed in shipping lanes which makes them susceptible to mortality or injury from vessel strikes (Douglas et al. 2008).

Calambokidis et al. (2024) defined a parent BIA for humpback whales from March to November spanning coastal waters from the Channel Islands to Canada. This area, which covers 20% of the West Coast EEZ and nearly all coastal waters in the action area, accounts for 93% of feeding sightings and 98% of the area used by tagged humpback whales. The parent BIA includes the entirety of the Humboldt WEA and the eastern portion of the Morro Bay WEA. The core BIA covers 27% of the parent area, and accounts for 74% of feeding sightings and 60% of the area used by tagged whales. The core BIA overlaps most of the eastern boundary of the Humboldt WEA and does not overlap the Morro Bay WEA. The nearshore location of the core BIA for humpback whales likely includes areas that will be used by vessels serving the WEAs.

Recently, Curtis et al. (2022) published new information regarding the abundance estimate of the Central America/Southern Mexico DPS. Using spatial capture-recapture methods based on photographic data collected between 2019 and 2021, researchers estimated the abundance of this stock to be 1,496 (CV=0.171) whales, which represents the best estimate of the Central America/Southern Mexico-CA/OR/WA stock of humpback whales. In the 2022 SAR, the PBR for this stock was calculated to be 5.2 animals. Assuming 8 months of residency time, the total PBR for this stock (5.2) is pro-rated by two-thirds (8/12 months), to yield a PBR in U.S. waters of 3.5 whales per year (Carretta et al. 2023a).

Given the Curtis et al. (2022) abundance estimate for whales wintering in southern Mexico and Central America (1,496) and the most recent estimate of humpback whales foraging off the U.S. West Coast (4,973; Calambokidis and Barlow 2020), the estimated abundance for the Mainland Mexico-CA/OR/WA stock is 3,477 animals. Assuming 8 months of residency time in U.S. West Coast waters, or two-thirds of the year, this yields a PBR in U.S. waters of 43 whales per year for this stock (Carretta et al. 2023a). Recently, Cheeseman et al. (2024) used mark-recapture methods on the largest individual photo-identification dataset ever assembled for cetaceans to estimate abundances of Pacific humpback whales. They found that the abundance of humpbacks wintering in the mainland Mexico region grew on average 7.1% annually from 2002-2015 to about 7,500 whales, before stabilizing with an average 0.9% annual growth from 2016-2021. This estimate of growth rate roughly matches the growth of the total abundance of humpback whales off the U.S.West Coast from Calambokidis and Barlow (2020). Based on all the available information, we conclude that 7,500 is the best current assessment of the abundance of the Mexico DPS.

Critical habitat has been designated for the two ESA-listed humpback whale DPSs that forage off the U.S. West Coast (86 FR 21082; April 21, 2021) that overlaps much of the action area, including the entirety of both the Morro Bay and Humboldt WEAs. Off the Oregon coast the nearshore boundary is defined by the 50-m isobath, and the offshore boundary is defined by the 1,200-m isobath relative to the mean lower low water (MLLW) except in areas south of 42° 10' N, where the offshore boundary is defined by the 2,000-m isobath. Off the California coast, the nearshore boundary is defined by the 50-m isobath relative to MLLW except, from 38° 40′ N to 36° 00′ N, the nearshore boundary is defined by the 15-m isobath relative to MLLW; and from 36° 00′ N to 34° 30′ N, the nearshore boundary is defined by the 30-m isobath relative to MLLW. North of 40° 20′ N, the offshore boundary of the critical habitat is defined by a line corresponding to the 2,000-m isobath, and from 40° 20′ N to 38° 40′ N, the offshore boundary is defined by the 3,000-m isobath. From 38° 40′ N southward, the remaining areas have an offshore boundary defined by a line corresponding to the 3,700-m isobath.

Sperm whales are found throughout the north Pacific Ocean, with year-round occurrence off California, and occurrence off Oregon and Washington during every season except winter. Off California they reach peak abundance from April through mid-June, and then from the end of August through mid-November (Carretta et al. 2023a). Sperm whales are typically found foraging in deep water, canyons and escarpments and could be found in the action area, although they are generally found further offshore. Using a trend-based model, Moore and Barlow (2014) estimated the abundance of the California/Oregon/Washington stock of sperm whales to be 1,997 animals, with an uncertain but presumed stable trend. With a minimum estimate of 1,270 whales, PBR for this sperm whale stock is currently 2.5 animals (Carretta et al. 2023a).

Two populations of gray whales are found in the Pacific Ocean; the eastern North Pacific (ENP) stock found primarily along the west coast of North America, and the western North Pacific (WNP) stock found primarily along the coast of eastern Asia. ENP gray whales are not listed under the ESA, but are protected under the MMPA. They undergo coastal yearly migrations along the U.S. West Coast, from their breeding/calving grounds in Mexico to northern feeding grounds along the West Coast and primarily in Alaska. The most recent population abundance estimate is around 27,000 whales (from 2015-16; Carretta et al. 2023a).

The Western North Pacific gray whale population is listed as endangered under the ESA. As summarized in the final 2022 SAR (Carretta et al. 2023a), information from tagging, photo-identification and genetic studies show that some WNP whales identified off Russia have been observed in the eastern North Pacific, including coastal waters of Canada, the U.S. and Mexico. The number of whales documented moving between the WNP and ENP represents 14% of gray whales identified off Sakhalin Island and Kamchatka according to Urban et al. (2019). Some whales that feed off Sakhalin Island in summer migrate east across the Pacific to the west coast of North America in winter, while others migrate south to waters off Japan and China. Cooke et al. (2019) note that the fraction of the WNP population that migrates to the ENP is estimated at 45-80% and note "therefore it is likely that a western breeding population that migrates through Asian waters still exists."

The population size from photo-identification data for Sakhalin and Kamchatka in 2016 was estimated at 290 whales (90% percentile intervals = 271–311; Cooke et al. 2017, Cooke et al. 2018). Of these, 175-192 whales are estimated to be predominantly part of a Sakhalin feeding aggregation. From a minimum population estimate of 271 whales, PBR for the WNP gray whales is 0.12 whales per year, or approximately one whale every 8 years (Carretta et al. 2023a).

The BIAs for gray whales revised by Calambokidis et al. (2024) contain the migratory corridor of ENP gray whales (and likely a small number of WNP gray whales), and are therefore concentrated in nearshore waters with no overlap of the Morro Bay and Humboldt WEAs. Depending on the season, vessels may transit through the migratory BIAs, particularly when traveling between ports and the survey areas. Within the action area, the parent gray whale migratory BIA spans November to June and includes all waters out to 15 km from shore along the Oregon coast and 10 km from shore along the California coast. Three subset BIAs were defined based on direction and life stage of the migrating whales. From November to February, a BIA for southbound gray whales extends to 10 km offshore along the whole U.S. West Coast. From January to May, a BIA for northbound whales (primarily adults and juveniles) extends to 15 km from shore along the Oregon coast and to 8 km along the California portion of the action area. An additional northbound BIA for migrating mother-calf pairs is defined from March to May, extending 5 km from shore within the action area.

Southern Resident killer whales (SRKWs) occur along the outer coasts of Oregon and California, and may be found within the action area. They are one of NMFS' ten "Species in the Spotlight" given their high risk of extinction. There are fewer than 75 animals left in the endangered SRKW DPS[2] (minimum population estimate of 74 animals in the final 2022 SAR; Carretta et al. 2023a). With such a small population, the PBR for SRKWs is 0.13 whales per year, or approximately 1 animal every 7 years. The abundance of this DPS grew steadily from the mid-1980s to mid-1990s, reaching a peak of 98 animals in 1995. This was followed by a decline coinciding with low salmon abundance from 1995 to 2001. Abundance has fluctuated since, but exhibits an overall negative trend.

This population consists of three pods, identified as J, K, and L pods, two of which (K and L) have been documented using areas off the coast of Oregon and northern California; primarily from January through April. Satellite telemetry, opportunistic sightings, and acoustic recordings

[2] Recent census data by the Center for Whale Research is that the population stands at 73 whales as of July, 2024. https://www.whaleresearch.com/orca-population

suggest that SRKWs spend nearly all of their time on the continental shelf within 34 km (21.1 miles) from shore in waters less than 200 meters deep (Hanson et al. 2017). Satellite telemetry has shown that tagged whales use a relatively narrow band of coastal waters, with 75% of locations occurring in a band from 2 to 12 km from shore along the Oregon coast, and from 2 to 5 km from shore along the California coast.

Critical habitat for SRKWs has been designated off the U.S. West Coast from Cape Flattery, Washington to Point Sur, California between the 6.1-meter and 200-meter depth contours (86 FR 41668; August 2, 2021). This designation does not overlap either the Morro Bay or Humboldt WEAs, but does include many of the nearshore waters within the action area used by SRKWs for foraging and transit between high use foraging areas. Physical and biological features include: 1) water quality to support growth and development; 2) prey species of sufficient quantity, quality, and availability to support individual growth, reproduction and development, as well as overall population growth; and 3) passage conditions to allow for migration, resting and foraging. Designated critical habitat for SRKW that overlaps the action area includes: Area 3 (Central/Southern Oregon Coast Area, with passage being the primary feature), Area 4 (Northern California coast, from the Oregon/California border south to Cape Mendocino, with prey being the primary feature, but with passage and water quality serving as important features), Area 5 (North/Central California coast area from Cape Mendocino south to Pigeon Point, with passage being the primary feature), and Area 6 (Monterey Bay area, with prey being the primary feature, but with passage and water quality serving as important features) (NMFS 2021a).

Calambokidis et al. (2024) used this designated critical habitat, and similar designations by DFO Canada to define a parent BIA for SRKWs. Within the action area, the parent BIA is the same as the critical habitat described above. A year-round core BIA was also defined that extends from Washington into waters of northern Oregon. This includes a portion of the northeastern corner of the action area from Astoria to Cape Lookout. The core SRKW BIA does not overlap the Morro Bay or Humboldt WEAs.

Guadalupe fur seals, an otariid species designated as threatened in 1985, may be found in the action area, although they are generally considered rare particularly compared to the vast abundance of non-listed pinnipeds found in the area. Guadalupe fur seals pup and breed primarily at Guadalupe Island, Mexico. In 1997, a small number of births was discovered at Isla Benito del Este, Baja California, and a pup was born at San Miguel Island, California (Melin and DeLong 1999). Since 2008, individual adult females, subadult males, and between one to three pups have been observed annually on San Miguel Island, and an adult male has regularly been found at San Nicolas Island (NMFS-National Marine Mammal Lab unpublished data). Researchers know little about the whereabouts of Guadalupe fur seals during the non-breeding season from September through May, but they are presumably solitary when at sea. While distribution at sea is relatively unknown, data from observations of tagged individuals indicates

Guadalupe fur seals may migrate at least 800 km from the rookery sites (Norris and Elorriaga-Verplancken, 2019). Strandings of Guadalupe fur seals have occurred along the entire U.S. West Coast, particularly in recent years, suggesting that Guadalupe fur seals may be expanding their range (Hanni et al. 1997; NMFS-West Coast Region-stranding program unpublished data). Due to extreme ocean warming (marine heat waves) that likely resulted in suboptimal prey conditions, Guadalupe fur seals began stranding in higher numbers in 2015 through 2021, during which NOAA Fisheries declared an "unusual mortality event" for the species[3].

Since the 1950s, the species has recovered from an estimated population of 200-500 animals to approximately 20,000 in 2010 (Carretta et al. 2022; Aurioles-Gamboa et al. 2017). In 2010, approximately 17,000 were counted on Guadalupe Island and 2,500 counted on San Benito Archipelago (García-Capitanachi 2011). Garcia-Aguilar et al. (2018) argues this was an underestimate, and suggested an updated estimate of 34,000-44,000 individuals in 2013. The current minimum population estimate is 31,019, and PBR is 1,062 animals (Carretta et al. 2023a). The best available estimated annual growth rate of the Guadalupe fur seal from 1984-2013 is 5.9% (Garcia-Aguilar et al., 2018; in Carretta et al. 2022).

Sea Turtles

Based on our stranding records (1958-present), observer program reports (1990-present), and research/sightings, Pacific leatherbacks and the North Pacific loggerhead DPS of sea turtles may be found in the action area and may be affected by the proposed action.

Leatherback turtles lead a completely pelagic existence, foraging widely in temperate and tropical waters except during the nesting season when gravid females return to tropical beaches to lay eggs. Leatherbacks are highly migratory, exploiting convergence zones and upwelling areas for foraging in the open ocean, along continental margins, and in archipelagic waters. Satellite tracking of post-nesting females and foraging males and females, as well as genetic analyses of leatherback turtles caught in U.S. West Coast fisheries or stranded on the U.S. West Coast indicate that leatherbacks found off the Pacific Northwest and the California coast are from the western Pacific nesting population (Benson et al. 2007, 2011). Benson et al. (2020) compared the estimated abundance of leatherbacks off central California from aerial surveys conducted during 1990-2003 and 2004-2016 and found an overall population decline of 3.7% annually, although there was interannual variability in abundance that could be related to ocean condition, prey availability, and remigration intervals. Martin et al. (2020) provided a median estimate of the total number of nesting females at the two main nesting beaches in the western Pacific (Jeen Yessa and Jeen Suab, formerly Jamursba Medi and Wermon, respectively) of 799 females (95% credible interval of 666 to 942 females). Given that this represents 50 to 75 percent of the nesting females in the western Pacific, a conservative application of 75 percent

[3] https://www.fisheries.noaa.gov/national/marine-life-distress/2015-2021-guadalupe-fur-seal-and-2015-northern-fur-seal-unusual). This event was closed in 2021 when strandings decreased.

results in a total number of nesting females of 1,054 leatherbacks (95% credible interval of 888 to 1,256 females).

Leatherbacks rarely strand off California and Oregon, although they have recently been reported in this area entangled in fixed gear fisheries and struck by vessels, particularly in the central California area where they are likely hit by ships entering the San Francisco Bay/Oakland Bay ports.

Leatherback critical habitat was designated in 2012 (77 FR 4170) and overlaps portions of the action area, specifically: 1) in the area north of Cape Blanco, Oregon east of the 2,000 meter depth contour; and 2) along the California coast from Point Arena to Point Arguello east of the 3,000 meter depth contour, which includes the entirety of the Morro Bay WEA; and 3) the area bounded by San Francisco Bay north to Point Arena, California along the 200-meter isobath, where vessels may travel from San Francisco Bay to the Morro Bay or Humboldt WEAs. Critical habitat includes waters from the ocean surface down to a maximum depth of 80 m (262 feet), based on known information about foraging depth of leatherbacks off the U.S. West Coast (NMFS 2012a). The primary constituent element considered essential for the conservation of leatherbacks is "the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (Chrysaora, Aurelia, Phacellophora, and Cynea), of sufficient condition, distribution, diversity, and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks."

North Pacific loggerhead DPS animals have been documented off the U.S. West Coast within the action area, but are primarily found south of Point Conception, California. These turtles originate from nesting beaches in Japan, where the number of females returning to deposit their nests have been increasing, based on available nesting information from three index beaches from 1985 to 2015. The most recent estimate of abundance is 8,733 nesting females, with an increasing population growth of 2.3 percent annually (Martin et al. 2020), but we note that we do not have loggerhead nesting information post-2015. Loggerheads have been captured in the California drift gillnet fishery (1990-present; NMFS observer program), although their presence appears to be closely correlated with anomalously warm sea surface temperatures, such as during El Niño conditions. NMFS conducted aerial surveys of the Southern California Bight in 2015 (a year when the sea surface temperatures were anomalously warm, and an El Niño was occurring) and estimated more than 70,000 loggerheads were present throughout the area (Eguchi et al. 2018), likely feeding on their preferred prey of pelagic red crabs and pyrosomes.

Green sea turtles that may be found within the action area, albeit rarely, originate from nesting beaches in the eastern Pacific, likely from mainland Mexico and the offshore islands. Information suggests steady increases in nesting at the primary nesting sites in Michoacan, Mexico, and in the Galapagos Islands since the 1990s (Senko et al. 2011). Colola beach in

Michoacán is the most important green turtle nesting area in the eastern Pacific; it accounts for over 75% of total nesting in Michoacán and has the longest time series of monitoring data since 1981. Nesting trends at Colola have continued to increase since 2000 with the overall eastern Pacific green turtle population also increasing at other nesting beaches in the Galapagos and Costa Rica (Wallace et al. 2010). Based on 2022/2023 nesting beach monitoring efforts, ~35,000 adult females nest at Colola beach each season. At Maruata, a secondary nesting beach in Michoacán, researchers estimate there are between 4,000 and 6,000 nesting females (Delgado-Trejo, Instituto de Investigaciones sobre los Recursos Nationale, personal communication, November, 2023). Using an average remigration interval of three years, the total number of female green turtles nesting throughout Michoacán is estimated to be 105,000 (Delgado-Trejo and Bedolla-Ochoa 2024).

Two foraging populations are found in U.S. waters south of the action area, and there are few strandings of green sea turtles in the southern portion of the action area (south of Point Conception), likely because areas north of Santa Monica Bay do not contain the species' preferred prey and the temperatures are likely too cold for them to withstand. Green turtles off the U.S. West Coast tend to reside and forage in coastal waters, estuaries and bays, where they face elevated threats from vessel strikes and interactions with recreational fisheries. They are rarely encountered offshore. The California drift gillnet fishery, which typically operates in the Southern California Bight, has interacted with one green turtle in the last two decades.

On July 19, 2023, NMFS proposed designation of green sea turtle critical habitat in nearshore waters off the coast of California (88 FR 46572). This proposed critical habitat area extends as far north as Santa Monica Bay, which is south of the action area.

Like leatherback turtles, most olive ridley turtles lead a primarily pelagic existence, migrating throughout the Pacific, from their nesting grounds in Mexico and Central America to the deep waters of the Pacific that are used as foraging areas. The eastern Pacific population is thought to be increasing, while there is inadequate information to suggest trends for other populations. Since reduction or cessation of egg and turtle harvest in both Mexico and Central America in the early 1990s, annual nest totals have increased substantially. On the Mexican coast alone, at a major nesting beach alone (La Escobilla), a mean annual estimate of nesting females was over one million (*in* NMFS and USFWS 2014). Eguchi et al. (2007) analyzed sightings of olive ridleys at sea, leading to an estimate of 1.15 to 1.62 million turtles in the eastern tropical Pacific based on a weighted average of yearly estimates from 1992-2006. Olive ridleys rarely strand in southern California, and there has been only one documented interaction with the California drift gillnet fishery (in 1999) since 1990.

Marine and Anadromous Fish and Invertebrates

The ESA-listed fish species expected to occur within the action area are salmonids (Chinook salmon, coho salmon, chum salmon, and steelhead) from the various ESUs and DPSs that mix in the oceanic environment, SDPS green sturgeon, oceanic whitetip shark, scalloped hammerhead shark Eastern Pacific DPS, giant manta ray, and SDPS Pacific eulachon (Table 7). Listed marine invertebrates that occur within the action area include black abalone, white abalone, and sunflower sea star (proposed for listing).

Chinook salmon occur along the Pacific coast and inland from the Ventura River in California to Point Hope, Alaska. Juvenile Chinook salmon tend to occur closer inshore than other juvenile salmonid species, generally within the 100-meter isobaths, and are occasionally found within the surf zone. Adult Chinook salmon can be found from the surface of the ocean to several hundred meters depth (Walker et al. 2007, Sabal et al. 2023). Within the action area, nine ESUs of Chinook salmon individuals may occur that are either threatened or endangered under the ESA (see Table 8), and the only designated critical habitat that occurs are within estuaries, ports, or harbors where vessel traffic might occur. Juvenile, sub-adult, and adult life stages are expected to occur throughout the action area.

Coho salmon occur in the North Pacific Ocean and inland from Santa Barbara, California to Point Hope, Alaska. Juvenile salmonids are pelagic and typically surface-oriented, most often found in the upper 20 meters of the water column (Beamish et al. 2000). Adult coho salmon tend to occur at shallower depths (< 40 meters) than adult Chinook salmon (Walker et al. 2007). Within the action area, four ESUs of coho salmon individuals may occur that are either threatened or endangered under the ESA (see Table 7), and the only designated critical habitat that occurs are within estuaries, ports, or harbors where vessel traffic might occur. Juvenile, sub-adult, and adult life stages are expected to occur throughout the action area.

While at sea, steelhead occur in pelagic waters principally within 10 meters from the surface, though they sometimes travel to greater depths (Light et al. 1989). Within the action area, 11 DPSs of steelhead individuals may occur that are either threatened or endangered under the ESA (see Table 8), and the only designated critical habitat that occurs are within estuaries, ports, or harbors where vessel traffic might occur. Juvenile, sub-adult, and adult life stages are expected to occur throughout the action area.

Spatial and temporal distribution and abundance of salmonids within offshore waters of the action area are not well understood. Salmonids likely pass through offshore waters within the action area during migrations to or from northern or southern feeding grounds, or may actively feed in these waters during certain times of year. Most studies of juvenile salmonid ocean distribution have focused on the nearshore environment (within several kilometers of shore), with information on salmonids in offshore waters much more limited. One study that included offshore waters by Harding et al. (2021) analyzed NMFS salmonid trawl survey data collected in

2010-2015 from Heceta Head, Oregon to Pigeon Point, California (including areas near or in WEAs and proposed cable routes). Trawl stations for the study were along transect lines to approximately 20 miles (~32 km) from shore, although in some years trawls were not conducted at some of the further offshore stations. Sampling occurred in June or July and, in some years, fall months. The main survey target was juvenile Chinook, although other juvenile and subadult salmonids were captured. Catches of juvenile salmonids (less than 250 mm in length) decreased with distance from shore, although catches occurred in small numbers at the furthest offshore stations. This trend of decreasing abundance with distance from shore was not as clear for subadult salmonids (fish greater than 250 mm in length), and steelhead greater than 250 mm generally had the highest catches at the trawl stations furthest offshore. Several studies examined adult salmonid distribution in the ocean, typically through analysis of recreational and commercial fisheries data; however, few studies describe distributions in the offshore ocean environment in the action area. Bycatch data from some commercial fisheries demonstrate adult Chinook salmon occur at depths from near the surface to several hundred meters and, while they are more common in areas closer to shore, also occur well into offshore waters (Sabal et al. 2023). In summary, available data on salmonid distribution suggest juveniles and adults may be found in offshore waters, and abundance may vary by life stage and species.

The southern DPS of green sturgeon was listed as a threatened species in 2006 (71 FR 17757) and includes all spawning populations south of the Eel River (exclusive), principally including the Sacramento River green sturgeon spawning population. The life history of SDPS green sturgeon is summarized in the 2021 five-year status review (NMFS 2021b). Green sturgeon are anadromous and adults of the southern DPS spawn every three to four years primarily in the upper Sacramento River, although more recently spawning has been documented in the Feather and Yuba rivers, which are tributaries to the Sacramento River. After rearing in freshwater or the estuary of their natal origin for 1-4 years, SDPS green sturgeon transition to the subadult stage and move from estuarine to coastal marine waters. Green sturgeon are benthic feeders, and often feed on invertebrates found in estuary and marine habitats with mud or sand substrate (NMFS 2021b). Subadult and adult green sturgeon have a marine and coastal range that extends from the Bering Sea, Alaska (Colway and Stevenson 2007) to El Socorro, Baja California, Mexico (Rosales-Casian and Almeda-Juaregui 2009). SDPS green sturgeon have been observed in large concentrations in the summer and autumn within coastal bays and estuaries along the west coast of the U.S., particularly in the Columbia River estuary, Willapa Bay, Grays Harbor, Humboldt Bay, San Francisco Bay and as far south as Monterey Bay (Goldsworthy et al. 2016; Huff et al. 2012; Lindley et al. 2008; Lindley et al. 2011; Moser and Lindley 2007). Green sturgeon typically occupy depths of 20 to 70 m while in marine habitats (Erickson and Hightower 2007, Huff et al. 2011). Therefore, SDPS green sturgeon are expected within portions of the action area during project activities, including nearshore marine waters and several bays and harbors where vessel transits and surveys of potential cable routes may occur. However, green sturgeon are not expected in WEAs, as they primarily forage on the seafloor and their depth range is not known to include the depths found in the WEAs.

Critical habitat for SDPS green sturgeon was designated in 2009 (74 FR 52300) and includes coastal marine waters from Monterey Bay north to Cape Flattery, Washington, and is restricted to the nearshore areas of the ocean in depths of less than 60-fathoms (~110 meters). SDPS green sturgeon critical habitat also includes some estuaries, such as San Francisco Bay and Humboldt Bay, California. Essential features identified for the nearshore coastal marine areas include: migratory corridors within marine and between estuarine and marine habitats; water quality, and food resources, which may include benthic invertebrates and fishes. The action area overlaps with the SDPS green sturgeon critical habitat where vessel traffic and surveys along cable routes are expected to occur.

The oceanic whitetip shark was globally listed as a threatened species in 2018 (83 FR 4153). The life history of the oceanic whitetip shark is summarized in the 2024 status report (NMFS 2024b). Oceanic whitetip sharks are highly mobile, found primarily in tropical and subtropical waters around the globe. Oceanic whitetip sharks are apex predators in pelagic ecosystems, feeding primarily on teleost fishes and cephalopods, but may also consume sea birds, marine mammals, other sharks and rays, molluscs, crustaceans, and garbage (NMFS 2024b). It generally remains offshore in the open ocean, on the outer continental shelf, or around oceanic islands in water depths greater than 184 m. In the eastern Pacific, the species occurs from southern California to Peru, including the Gulf of California and Clipperton Island (Compagno 1984). Although it occurs in waters between 15ºC and 28ºC, this species exhibits a strong preference for the surface mixed layer in warm waters above 20°C (Bonfil et al. 2008). It is capable of tolerating colder waters to 7.75°C for short durations, as shown by brief, deep dives beyond 200 m (Howey-Jordan et al. 2013, Howey et al. 2016). Although it may explore extreme environments (e.g., deep depths, low temperatures) as a potential foraging strategy, exposure to these cold temperatures and depths is typically brief (Musyl et al. 2011, Tolotti et al. 2015). The species is expected to be extremely rare in the action area due to ocean temperatures typically remaining below 20°C, but could be encountered in WEAs or along vessel transit routes especially if ocean temperatures rise above 20°C (e.g., during El Nino events or other anomalously warm oceanographic events).

The Eastern Pacific DPS of scalloped hammerhead sharks was one of four DPSs listed under the ESA in 2014 (79 FR 38214). The life history of scalloped hammerhead shark is summarized by Miller et al. (2014), and the most recent five-year status review was completed by NMFS in 2020 (NMFS 2020). Scalloped hammerhead shark is a circumglobal species that lives in coastal warm temperate and tropical seas. As either solitary individuals or in aggregations, it occurs over continental and insular shelves, as well as adjacent deep waters (Compagno 1984, Schulze-Haugen and Kohler 2003). Although it is seldom found in waters cooler than 22°C, a tagged scalloped hammerhead shark in the Gulf of California spent time in water temperatures as cold as 4.8°C. It typically ranges from the intertidal and surface to depths of up to 512 m (Sanches 1991, Klimley 1993), but has been documented diving to nearly 1,000 m (Jorgensen et al. 2009).

It is also known to enter enclosed bays and estuaries (Compagno 1984). The scalloped hammerhead shark is an apex predator and opportunistic feeder with a diet that includes a wide variety of teleost fishes, cephalopods, crustaceans, and rays (Compagno 1984, Bush 2003, Júnior et al. 2009, Noriega et al. 2011). Distribution of the scalloped hammerhead shark Eastern Pacific DPS extends from southern California to Peru (Miller et al. 2014). The species is expected to be extremely rare in the action area due to ocean temperatures typically remaining below 22°C, but could be encountered in WEAs or along vessel transit routes especially if ocean temperatures rise above 22°C (e.g., during El Nino events or other atypical oceanographic events).

Giant manta rays were globally listed as a threatened species in 2018 (83 FR 2916). The life history of the giant manta ray is summarized in the status review supporting the ESA listing (Miller and Klimovich 2017). The species is found worldwide in tropical, subtropical, and temperate ocean waters offshore and near productive coastlines (Marshall et al. 2009, Kashiwagi et al. 2011). The species has also been observed in estuarine waters, oceanic inlets, and within bays and intercoastal waterways. The giant manta ray is a migratory species, with some individuals traveling up to 1,500 km, although studies also suggest a high degree of residency for many individuals (Hearn et al. 2014). Giant manta rays are slow-growing with highly fragmented populations that are sparsely distributed across the world. As such, the species is infrequently encountered with the exception of a few areas of known manta ray aggregations, typically near islands or coral reefs (Miller and Klimovich 2017). It is the world's largest ray with a wingspan of up to 26 feet, and is a filter feeder that eats large quantities of zooplankton. Seasonal migrations may be driven by zooplankton concentrations, current circulation and tidal patterns, seasonal upwelling, seawater temperature, and possibly mating behavior. Depths used by giant manta rays can be quite variable. Feeding aggregations can occur in waters less than 10 m (Rohner et al. 2013); however, tagging studies also indicate the species regularly dives 200 to 450 meters and can dive beyond 1,000 meters (Rubin et al. 2008, Marshall et al. 2011, Stewart et al. 2016). Giant manta rays typically use waters 19°C or warmer, although temperature preference may vary by region (Duffy and Abbott 2003, Marshall et al. 2009, Freedman and Roy 2012, Graham et al. 2012, Hacohen-Domené et al. 2017). The species has been observed as far north as southern California in the U.S. West Coast as bycatch in the California drift gillnet fishery targeting swordfish, typically during El Niño events (Larese and Coan 2008). Confirmed observations of giant manta ray are lacking in central and northern California (north of Point Conception). However, potential observations of giant manta rays were made in the Morro Bay WEA during surveys in 2024. The species is expected to be extremely rare in the action area due to ocean temperatures typically remaining below 19°C, but could be encountered in WEAs or along vessel transit routes especially if ocean temperatures rise above 19°C (e.g., during El Nino events or other atypical oceanographic events).

The southern DPS of eulachon was listed as threatened in 2010 (75 FR 13012) and includes all eulachon within the states of Washington, Oregon, and California, encompassing those that spawn in rivers south of the Skeena River in British Columbia to the Mad River in northern California. The most recent five-year review of the southern DPS of eulachon was conducted in 2022 (NMFS 2022a). Larvae are transported rapidly by spring freshets from rivers where spawning occurs to estuaries and juveniles disperse onto the continental shelf within the first year of life (Hay and McCarter 2000). Adult eulachon spend most of their lives in schools between the nearshore and the outer continental shelf environments (CDFW 2008). Eulachon are caught in NMFS research trawl surveys beginning at age-1+ over the continental shelf and slope off the U.S. West Coast, at depths between 50 and 608 m (Gustafson et al. 2010). Eulachon are also caught as bycatch in U.S. West Coast groundfish fisheries and ocean shrimp trawl fisheries, although sorting grid bycatch reduction devices and LED lights on the footrope of the shrimp trawl fisheries may reduce eulachon bycatch (NMFS 2022a). Their potential occurrence in the action area is expected within portions of the WEAs, nearshore areas, and cable routes. Eulachon critical habitat exists in several rivers and estuaries in California and Oregon, and does not overlap the action area.

Black abalone were listed as an endangered species in 2009 (74 FR 1937). The life history of black abalone is summarized in the recovery plan (NMFS 2020a). The life cycle of abalone includes a short planktonic larval stage, a cryptic juvenile stage, and an adult stage with separate sexes. Larvae typically settle in rocky habitat and feed on crustose coralline algae, shifting to attached and drift macroalgae food sources as they become adults (Bergen 1971). Black abalone juveniles and adults occur in the high rocky intertidal to six meters depth from Point Arena, California, to Baja California, Mexico, and are typically found in complex rock habitats with deep crevices that provide shelter from predation (Haaker et al. 1995). Black abalone is expected to occur within the action area south of Point Arena, in waters 6 m deep or less.

Critical habitat for black abalone (76 FR 66806) includes rocky intertidal and subtidal areas within the marine waters on portions of the California coast south of Point Arena from Mean Higher High Water to 6 meters depth. Critical habitat is not present near Humboldt Bay. In the vicinity of Morro Bay, California, critical habitat includes three Specific Areas within the action area: 1) Prewitt Creek, Monterey County, to Cayucos, San Luis Obispo County, 2) Montanã de Oro State Park in San Luis Obispo County, to just south of Government Point, Santa Barbara County and, 3) from the Palos Verdes/Torrance border to Los Angeles Harbor Los Angeles County.

White abalone were listed as an endangered species in 2001 (66 FR 29046). The life history of white abalone is summarized in the recovery plan (NMFS 2008). The white abalone range extends from Point Conception, California to Punta Abreojos, Baja California, Mexico and includes offshore islands and banks (NMFS 2008). The species primarily feeds on algae and may live up to 40 years (Tutschulte 1976). It has a planktonic larval stage that lasts for about two weeks followed by settling in benthic habitats (Leighton 1974). Adult white abalone typically occur in open, low relief rocky reefs or boulder habitat surrounded by sand (Hobday and Tegner

2000). Because suitable habitat is patchy, the distribution of white abalone is also patchy (NMFS 2008). White abalone are the deepest living abalone species on the North American West Coast, with a depth range of 5-60 m (Cox 1960). Following widespread declines in the 1970s, remnant populations of white abalone have been most common in 30-60 m depths, and one survey found the highest densities in 40-50 m (Butler et al. 2006). White abalone presence is only expected within the action area south of Point Conception, and is currently extremely rare throughout its range.

The sunflower sea star was proposed to be listed as a threatened species in 2023 (88 FR 16212). The species occupies intertidal and subtidal marine waters from Adak Island, Alaska, to Bahia Asunción, Baja California Sur, Mexico. Sunflower sea star has been observed at depths beyond 435 m offshore of Oregon and central California, with a gradual decline through ~600 m and sporadic occurrence to a maximum depth of 1,158 m (3,799 ft; e.g., Keller et al. 2008). The species is a habitat generalist, occurring over sand, mud, and rock bottoms both with and without appreciable vegetation. Prey include a variety of epibenthic and infaunal invertebrates, and the species also excavates clams from soft substrates. It is a well-known urchin predator and plays a key ecological role in controlling urchin populations. Sunflower sea star may be present throughout the action area in waters less than 1,158 m, but is currently rare throughout its range.

ENDANGERED SPECIES ACT

Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02). When evaluating whether the proposed action is not likely to adversely affect listed species or critical habitat, NMFS considers whether the effects are expected to be completely beneficial, insignificant, or discountable. Completely beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Effects are considered discountable if they are extremely unlikely to occur.

Vessel Interactions

Marine Mammals and Sea Turtles

Vessel strikes of marine mammals and sea turtles periodically occur along the California and Oregon coast. We do not have precise information on the rate at which collisions occur each year for specific species; however, vessel collisions are identified as known or possible cause of death for several ESA-listed and other large whale species, including fin whales, gray whales, humpback whales, and blue whales. We consider the risk of a vessel strike to a Guadalupe fur seal to be extremely low, given their nimble maneuverability and our lack of any reports of any injury or death to these species due to a vessel strike. Our estimates of vessel strikes of large whales is based on known incidents over the past 30 years, and is considered a minimum accounting. However, using a novel application of a naval encounter model, researchers estimated ship strike mortality of humpbacks, fin whales, and blue whales to be considerably higher than the minimum estimates available from stranding records (Rockwood et al. 2017). While we report on the number of reported vessel collisions herein, we recognize that reported incidents likely underestimate the actual occurrence of vessel collisions (Carretta et al. 2023a). Whale carcasses can sink and ships may not detect a whale strike, although this is more likely to be the case with large container vessels and tankers.

Based on the most recent final SAR (2022: Carretta et al. 2023a), SRKWs are rarely struck by vessels, and all of the known strikes (or indications of blunt trauma) have been in the Pacific Northwest (e.g., Georgia Strait, Haro Strait). Protective management measures to reduce the risk of vessel disturbance, auditory masking, and ship strikes in the Pacific Northwest have been put into place by NMFS and Canada, which likely have reduced the overall threat to SRKWs foraging and migrating in areas commonly used by vessels. In addition, SRKWs are much smaller (16-26 feet in length, depending on sex) compared to humpback whales (typically 43-49 feet in length), so they are likely more nimble, with less surface area to come into contact with a vessel. Similarly, sperm whales are rarely reported struck by ships, but there was a report of a ship strike in Oregon, and another one with a sablefish longline vessel (at idle speed, no injuries), both in 2007. Sperm whales are typically found in deeper waters, which reduces the co-occurrence with vessel traffic along the U.S. West Coast. From what we have learned from sperm whale entanglement in the California drift gillnet fishery, all bycatch events occurred in waters deeper than approximately 1,600 meters. Thus, compared to more coastal whale species such as humpbacks and gray whales, there is likely reduced spatial overlap between vessels associated with this proposed action and sperm whales (and therefore less risk). For the most recent 5-year period for sperm whales (2017-2021), there were no reported ship strikes of sperm whales (Carretta et al. 2023b), so while it may be unreported or underestimated, we believe that it is a rare event. Similarly, there were no reported ship strikes of a sei whale during the most recent time period (2017-2021) (Carretta et al. 2023b). Sei whales are distributed far offshore in temperate waters and do not appear to be associated with coastal features, which reduces their risk of vessel strikes associated with the proposed action, since project vessels will typically mobilize from ports within the action area from Astoria, OR to Port Hueneme, CA.

Given that the ENP (and a much smaller number of WNP) gray whales migrate relatively close to shore, they are much more vulnerable to vessels traveling to and from ports and harbors, and given the wide swath of ports that vessels may travel to and from the WEAs as part of the proposed action, this whale species may be the most vulnerable to vessel strikes. Not surprisingly, during the most recent five-year period (2017-2021), serious injury and mortality of ENP gray whales attributed to vessel strikes totaled 21 animals (Carretta et al. 2023b). In addition, NMFS declared an unusual mortality event (UME)[4] for gray whales due to increased strandings off the U.S. West Coast on December 17, 2018, which was closed on November 9, 2023. The peak of the strandings were reported through the end of 2020. The Investigative Team concluded that the preliminary cause of the UME was localized ecosystem changes in the whale's Subarctic and Arctic feeding areas that led to changes in food, malnutrition, decreased birth rates, and increased mortality all documented during the UME. The largest number of gray whales reported struck by vessels occurred from 2018-2019, so likely the whales were at increased risk of a vessel striking them, given their compromised health. All of the vessel strikes were attributed to ENP gray whales; however, as noted in the most recent SAR for the WNP gray whales, it is unknown if the oceanographic conditions related to this UME affected WNP and ENP gray whales similarly.

Given humpback whales' preference for feeding in relatively shallow waters (nearshore to ~200-400 m), they are also vulnerable to vessel strikes with 14 whales reported struck, with most (13.2) resulting in death or serious injury, between 2016 and 2020 (nearly 3 whales/year) (Carretta et al. 2023a). Blue whales are also susceptible to vessel strikes, with significant variability reported from year to year. From 2015-2019, four blue whale vessel strike deaths were observed, and since 2007, as many as five individuals have been reported struck in one year (2007) (Carretta et al. 2023a). Most of the reported strikes have been in southern California or off San Francisco, where blue whales seasonally forage close to shipping ports. In the most recent time period (2017-2021, there were no blue whales reported to be struck in 2020 or 2021 (Carretta et al. 2023b). Lastly, fin whales have been reported struck by vessels along the U.S. West Coast, with 7 whales killed from 2015-2019 (Carretta et al. 2023a). Three more fin whales were reported struck in 2021, with one off of San Francisco and two strikes by military vessels off of San Diego (Carretta et al. 2023b).

Vessel strikes also pose a threat to sea turtles. Leatherbacks are particularly vulnerable, especially in waters adjacent to the entrance into the ports of San Francisco/Oakland. Approximately 15 leatherbacks have been reported stranded in California over the last 40 years due to vessel collisions (around 1 every 3 years); a rate that has increased in recent years (R. LeRoux, NMFS-SWFSC, unpublished data). Sea turtles rarely strand off Oregon. Loggerhead and green sea turtles are primarily found in the Southern California Bight, and there are few, if

[4] Details of the unusual mortality event for eastern North Pacific gray whales may be found at https://www.fisheries.noaa.gov/national/marine-life-distress/2019-2023-eastern-north-pacific-gray-whale-ume-closed

any, documented vessel strikes of these turtles in the action area. As mentioned, olive ridleys are rarely found in the action area and most of the strandings are due to cold-stunning, so the chances of a vessel strike are highly unlikely.

The potential for vessel collisions to injure listed species depends on vessel speed and the manner in which encounters occur. A marine mammal or sea turtle at the surface could be struck directly by a vessel, a surfacing animal could hit the bottom of a vessel, or an animal just below the surface could suffer injuries from a propeller. For large whales in particular, the severity of injuries typically depends on the size and speed of the vessel (Knowlton and Kraus 2001; Laist et al. 2001; Vanderlaan and Taggart 2007). Because some whale species can avoid slower-moving vessels, reducing vessel speed is a practical measure for reducing the risk of vessel strikes of large whales. For instance, Wiley et al. (2011) determined that a 10-knot speed restriction in North Atlantic right whale Seasonal Management Areas reduced the risk of collisions by nearly 60% from the status quo. Less research is available for vessel interactions with sea turtles, but Hazel et al. (2007) found that green sea turtles fled less frequently and at shorter distances from vessels approaching at higher speeds than at lower speeds.

BOEM estimates that site characterization surveys may require as many as 2,700 vessel trips over a 5-year period (540 vessel trips/year on average) within the action area for the Morro Bay and Humboldt WEAs. This includes 250 trips for geophysical (HRG) and geotechnical surveys, spanning up to 3,650 days at sea (Table 4), and up to 2,450 10-hour trips for biological surveys (Table 5). BOEM also anticipates as many as 510 round trips (~100 trips/year) to support site assessment activities, such as buoy deployment, maintenance, and decommissioning (Table 3). During the 2024 survey season, a total of three HRG survey vessels operated in the California leases, and NMFS assumes that additional vessels may be used during future survey work.

BOEM BMPs state that during the proposed action, all vessels transiting to and from ports, conducting site characterization studies, surveys, metocean buoy installation, maintenance, or decommissioning will travel at speeds no more than 10 knots during all related activities, and that according to industry practice, survey vessel speeds are limited to 5 knots during HRG surveys. BOEM has included vessel strike avoidance measures in their BMPs (Appendix A of the BA) which include, but are not limited to: 1) maintaining a vigilant watch for all protected species; 2) maintaining a 500-m minimum separation distance for ESA-listed whales or other identified large marine mammals, or 100-m from any sea turtle visible at the surface (Vessel Strike Avoidance Zones); and 3) adhering to specific strike avoidance measures, including slowing, stopping, or changing course, as detailed in PDC 4 of the BA (Minimize Vessel Interactions with ESA-listed species). In survey reports received by NMFS so far, no protected species have been reported struck by vessels. This may be due in part to the reduced speeds and minimization measures and project design criteria employed when ESA-listed species are observed within the vessel strike avoidance zone. At slower speeds, captain, crew, and protected species observers will have more time to observe large marine mammals and sea turtles within a Vessel Strike Avoidance Zone and react accordingly. For example, if a large whale(s) is detected within 500 m of the forward path of any vessel, the operator will steer a course away from the animal(s) or stop their vessel to avoid any strike. If a sea turtle is sighted within the vessel's forward path, the vessel operator must slow to 4 knots (unless unsafe to do so) and steer away as possible. In addition, slower speeds may afford additional opportunity for detection and avoidance by individual marine mammals and sea turtles.

Vessels serving the WEAs may be transiting to and from ports in Oregon and California (ports such as Astoria, Newport, Coos Bay, Port Orford, Brookings, Crescent City, Humboldt Bay, San Francisco Bay, and Port Hueneme). As noted earlier, the action areas for both WEAs overlap numerous critical habitats and biologically important areas for large whales and leatherback sea turtles. In addition, we have identified areas of vulnerability for ESA-listed whales and leatherbacks to vessel strikes, particularly the area within and adjacent to the entrance to San Francisco Bay, where humpbacks, blue whales, gray whales, and leatherback turtles are particularly vulnerable especially when there are aggregations of prey. Stranding data from the last two decades indicates that vessel collisions with whales are attributed to a wide range of vessel activity, with shipping vessels being the most common source identified, although most often the type of vessel involved is unknown (NMFS unpublished stranding data). Off the U.S. West Coast, the vessel speed is rarely reported, but in a review of recent ship strikes (2017-2021), two humpbacks were reported killed by vessels traveling at 25-35 knots, and two fin whales were reported struck by military vessels (Carretta et al. 2023b), likely traveling at speeds over 20 knots. As noted by BOEM, Rockwood et al. (2017) estimated that 74 percent of blue whale, 82 percent of humpback whale, and 65 percent of fin whale known vessel strike mortalities occur in the shipping lanes associated with the ports of San Francisco and Los Angeles/Long Beach.

As part of their Pacific Coast Port Access Route Study (PARS), the U.S. Coast Guard evaluated marine traffic by analyzing vessel track data from Automatic Identification System (AIS) transponders off the U.S. West Coast for the years 2012, 2015, and 2017-2021 (USCG 2022). The scope of the PARS included ports that may be used by survey vessels within the action area, including Morro Bay, San Francisco Bay, Humboldt Bay, in California and Coos Bay, Yaquina Bay, and Astoria in Oregon. The analysis found that the most prominent users were cargo and recreational vessels and that overall traffic increased during the study period. The study area saw a 5-year average of 8,015 total vessels operated annually (676 fishing vessels, 224 tug and tow vessels, 3,062 recreational vessels, 304 passenger vessels, 2,822 cargo vessels, 576 tanker vessels, and 351 "other" vessels) collectively broadcasting 79,764 tracks per year. Since recreational vessels are not required to carry AIS, the estimates for this vessel class is likely an underestimate of the quantity of recreational traffic on the West Coast. For example, the Channel Islands National Marine Sanctuary (CINMS) Advisory Council's Marine Shipping Working

Group estimated a high of 4,485 different vessels transiting through the Santa Barbara Channel in 2013 (CINMS 2016), with many vessels going to and from the ports of Los Angeles/Long Beach. With increasing vessel traffic throughout the action area, including vessels transiting to and from San Francisco and other ports, the estimated actual vessel traffic in the action area during the proposed action is likely to be much higher. Within the Santa Barbara Channel, McKenna et al. (2015) estimated that of the majority of ships that pass through the Channel travel at average speeds of 19 knots, which, as noted earlier, increases the probability of severe injury to large whales, particularly if the whales have no time to avoid ships or the ships are traveling too fast to reduce a strike should the captain or crew see a large whale in its path.

Given the estimated 640 vessel trips per year by a small number of vessels associated with HRG, geotechnical and biological resources surveys, the incremental increase of vessel collision risk is a small fraction of the risk associated with the thousands of other vessels that operate in the action area. Furthermore, by requiring all project vessels operating within the action area to transit at speeds of 10 knots or less, regardless of whether they are within State or Federal waters, as well as requiring specific conservative BMPs for all vessel operators and crew, the risk of vessel strikes with ESA-listed species is greatly reduced, so that vessels strikes resulting from the proposed action are extremely unlikely to occur, and therefore discountable.

In addition to the risk posed by vessel collisions, it is also possible that ESA-listed turtles may become entrapped in moon pools, a term used to describe openings in vessel hulls used for deploying and retrieving AUVs and other equipment. Four instances of sea turtle entrapment (two loggerhead and two leatherback turtles) in moon pools have been documented aboard vessels operating in the Gulf of Mexico, with all animals released alive (NMFS 2020b). On the basis of these events, NMFS estimated the rate of moon pool entrapment relating to oil and gas activities in the Gulf of Mexico to be one sea turtle per year, with over 2,000 survey trips made annually. To date, no moon pool entrapments of sea turtles have been reported to NMFS on the U.S. West Coast despite decades of moon pool use by research and military vessels. The comparatively low density of sea turtles in these waters may contribute to this lack of reported entrapments. Distributions of loggerhead, green, and olive ridley turtles are concentrated in warmer areas south of Point Conception. Leatherback turtles have wider thermal tolerances, but Benson et al. (2020) estimated there to be fewer than 100 leatherbacks foraging off central California in the past two decades. Considering that both the intensity of oil and gas survey activity and the abundances of loggerhead and leatherback turtles in the Gulf of Mexico (NMFS and USFWS 2020, 2023) greatly exceed those of the proposed action, we anticipate that the risk of moon pool entrapment for the proposed action will be extremely low. BOEM's BMPs address the possibility of animal entrapment within moon pools, including protocols for monitoring for the presence of protected species, limiting the amount of the time that moon pool doors are left open when sea turtles may be present, and reporting entrapment of any protected species to NMFS. Given the low density of sea turtles in the action area compared with the Gulf of Mexico, and implementation of the BMPs, entrapment of ESA-listed within moon pools is extremely unlikely to occur, and is therefore discountable.

Marine and Anadromous Fish and Invertebrates

The only fish or invertebrate species likely to have a possibility of colliding with a vessel or propeller are limited to only the larger individuals, such as oceanic white-tip shark, Eastern Pacific DPS scalloped hammerhead shark, giant manta ray, or SDPS green sturgeon. Because of their preference for warmer water temperatures, oceanic white-tip shark, Eastern Pacific DPS scalloped hammerhead shark, and giant manta ray will be extremely rare within the action area; therefore, collisions with vessels involved in project activities are expected to be discountable for these species. The likelihood of collisions with SDPS green sturgeon are higher during Project-related vessel traffic within ports or estuaries. The most recent five-year status review for SDPS green sturgeon indicated that vessel strikes have become an increasing threat to SDPS green sturgeon (NMFS 2021b). In April 2018, a white sturgeon mortality from a propeller strike was documented in the Carquinez Strait (Demetras et al. 2020). In early 2020, an interagency team was formed to better understand sturgeon mortality associated with propeller and vessel strikes in San Francisco Bay. As of February 2021, in less than one year, the group had received reports of 23 sturgeon carcasses in the Carquinez Strait from members of the public (NMFS 2021b). Propeller and vessel strikes are known to be a limiting factor in the recovery of Atlantic sturgeon on the East Coast (Brown and Murphy 2010) and are now a growing concern for SDPS green sturgeon.

The hull of the vessel itself may hit sturgeon that fail to avoid a vessel and cause injury or mortality. It seems likely that the chance of injury and death by impact increases with the vessel's speed and mass, but there is no clear speed at which injury or mortality occurs for different types of vessels or for different sizes of sturgeon. Fast vessels have been implicated in shortnose sturgeon vessel strikes, but there is no information available to suggest a threshold speed at which a sturgeon is injured or killed by a vessel hull. More often observed is evidence that vessel strike mortalities occur when a propeller hits a sturgeon.

Not all fish entrained by a propeller will necessarily be injured or killed. Killgore et al. (2011) in a study of fish entrained in the propeller wash from a towboat in the Mississippi River, found that 2.4 percent of all fish entrained, and 30 percent of shovelnose sturgeon entrained, showed direct signs of propeller impact (only estimated for larger specimens). The most common injuries were a severed body/severed head, and lacerations. This is consistent with injuries reported for sturgeon carcasses in the Carquinez Strait of San Francisco Bay (Demetras et al. 2020) and other studies on Atlantic sturgeon (Balazik et al. 2021, Brown and Murphy 2010). Because the amount of vessel traffic is expected to be relatively small within the areas (estuaries or embayments) where SDPS green sturgeon are expected to be most common, and because of a 10-knot vessel speed limit, NMFS expects that vessel or propeller collisions for marine and anadromous fish and invertebrates will be extremely unlikely, and therefore discountable.

Noise

Here we consider the effects of noise from proposed activities on ESA-listed species. In order for a sound to be potentially disturbing or injurious, it must be able to be heard by an animal. Effects on an animal's hearing ability or disturbance can result in disturbance of important biological behaviors, including migration, feeding, communication, and breeding. Expected noise sources associated with geophysical and geotechnical surveys include propulsion (vessels, AUVs, ROVs), geotechnical equipment, and HRG equipment (see Tables 12 and 13).

The vessels used for the proposed action will produce low-frequency, broadband underwater sound below 1 kHz (for larger vessels), and higher-frequency sound between 1 kHz to 50 kHz (for smaller vessels), although the exact level of sound produced varies by vessel type. A study of sounds produced by a 150 ft long HRG survey vessel on the U.S. East Coast found propulsion and dynamic positioning thruster noise varied from 9.5 Hz to several kHz (Rand Acoustics 2024). This study measured vessel noise at 126.5 dB rms re 1uPa at 0.5 nautical miles (NM); vessel noise was highly audible from 2 NM, but audible and measurable up to 4 NM from the vessel.

While noise produced by propulsion as well as HRG equipment for seafloor mapping (e.g., multi-beam) is fairly continuous, geotechnical sampling and some seismic survey sources produce noise intermittently, often at much higher levels. Seismic equipment such as sparkers produce acoustic expansion pulses (i.e., impulses) that are typically transient, brief (less than 1 second), broadband, possibly repetitive, and consist of high peak sound pressure (SPLpeak) with rapid rise time and rapid decay (Popper et al. 2019). Impulsive sources near the seafloor can generate substrate waves that may travel great distances, especially at very low frequencies.

Hearing ranges for ESA-listed species expected within the action area vary considerably. Baleen whales hear lower frequency sounds, while sperm whales and some marine fish species hear higher frequency sounds (Tables 9-11). Hearing and acoustic perception in sea turtles as well as most marine and anadromous fish and invertebrates is within a much lower-frequency range.

Our analysis of the potential for auditory injury (i.e., permanent hearing damage) to ESA-listed marine mammals, PTS (permanent hearing damage) for sea turtles, and physical injury to fish and invertebrates focused on potential impacts from HRG surveys, because noise from propulsion and geotechnical equipment are not anticipated to physically impair these species (as discussed further below). In October 2024, NMFS updated their acoustic thresholds for marine mammals, including a user spreadsheet tool which can be used to calculate auditory injury exposure distance ranges for HRG sources. Table 11 provides a summary of distances (in meters) from mobile HRG sources within which the onset of auditory injuries are anticipated to occur. Source levels and frequencies of HRG equipment were measured under controlled conditions and represent the best available information for HRG sources (Crocker and Fratantonio 2016). BOEM produced the maximum impact scenarios, using the highest power levels and the most sensitive frequency settings for each hearing group. A geometric spreading model was used to estimate injury and disturbance distances for ESA-listed species. Because the spreadsheet and geometric spreading models do not consider the tow depth and directionality of the sources, these are likely overestimates of the distances at which actual injury and disturbance could occur. All sources were analyzed at a tow speed of 4.5 knots, and some equipment (multi-beam echosounder, CHIRP sub-bottom profiler, etc.) are expected to be primarily operated from an AUV and concentrate noise closer to the sea floor.

Due to the varying hearing sensitivities of different species groups, NMFS uses different sets of acoustic thresholds to consider effects of noise on ESA-listed species. Below, we present information on the thresholds produced for ESA-listed whales, Guadalupe fur seals, sea turtles, fish and invertebrates considered in this consultation.

<u>ESA-listed Whales and Otariids (Guadalupe fur seals)</u>

NMFS' *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing* compiles, interprets, and synthesizes the scientific literature to produce acoustic thresholds to assess how anthropogenic sound affects the hearing of all marine mammals under NMFS' jurisdiction (NMFS 2024a). Specifically, the guidance identifies the received levels, or thresholds, at which individual marine mammals are predicted to experience temporary (temporary threshold shift, or TTS) or permanent changes (auditory injury) in their hearing sensitivity for acute, incidental exposure to underwater anthropogenic sound sources. These thresholds (Table 8) represent the best available scientific information on acoustic impacts for marine mammals. We note that NMFS is in the process of developing technical guidance for assessing the effects of underwater anthropogenic sound on marine mammal behavioral disturbance (currently being peer-reviewed).

For impulsive sounds, two thresholds are used: one based on peak sound pressure level (SPL) that does not incorporate the duration of exposure, and another based on cumulative sound exposure level over a 24-hour period (cSEL). NMFS considers the onset of auditory injury to have occurred when either one of the two metrics is exceeded. These thresholds differ in regard to considering information on species hearing. The cumulative sound exposure criteria incorporate auditory weighting functions, which estimate a species group's hearing sensitivity, and susceptibility to temporary hearing impairment and auditory injury, over the exposed frequency range, whereas peak sound exposure level criteria do not incorporate any frequency dependent auditory weighting functions.

Potential for Injury: As shown in Table 11, for all ESA-listed marine mammals expected to occur in the proposed action area, the distances within which auditory injuries might occur are small, ranging from 0 (indicating no auditory injury anticipated at any distance) to 20.9 meters. Considering the cumulative threshold (24-hour exposure) noise levels, the equipment resulting in the greatest horizontal range (in meters) to the marine mammal threshold for the onset of auditory injury is the sparker (20.9 m for baleen whales, 6.7 m for Guadalupe fur seals, and 1.4 m for sperm whales). Animals in the survey area during the HRG surveys are extremely unlikely to incur any hearing impairment due to the characteristics of the sound sources, considering the source levels and generally very short pulses and duration. Individuals would have to make a very close approach and also remain very close to vessels operating these sources (less than 21 meters) in order to receive multiple exposures at relatively high levels, as would be necessary to have the potential to result in any hearing impairment. In reality, a whale swimming through the beam of devices used in HRG surveys may move in many different directions, thus rarely making its way through the beam center. The purpose of BOEM's PDC 3 is to minimize the impacts during geophysical survey operations; therefore, prior detection of protected species and shut down procedures will mitigate impacts to any ESA-listed marine mammals in the area. Finally, the restricted beam shape of many of the HRG survey devices planned for use makes it extremely unlikely that an animal would be exposed more than briefly during the passage of the vessel.

We note that the mitigation and monitoring proposed in PDC 3 is intended to reduce exposure of marine mammals and sea turtles to *towed* sound sources. Since AUVs are operated independently from the vessel, the use of PSOs and Clearance/Shutdown zones is not proposed by BOEM for use of AUVs. AUVs typically operate at speeds from 2-6 knots; they travel at around 3.5 knots during survey operations, and they have a 60-80 hour endurance. AUVs could be deployed in conjunction with UTPs, which operate at low power and produce very short pings, only when interrogated. BOEM states that an AUV can run many geophysical sensors at once, with a typical instrumentation payload including a multibeam echosounder (mobile, non-impulsive intermittent sound source), side-scan sonar (mobile, non-impulsive intermittent sound sound), magnetometer, and a sub-bottom profiler (mobile, impulsive intermittent sound source). Although some sub-bottom profilers are expected to be onboard AUVs, and therefore operating near the seafloor, we assume boomers and sparkers will be towed behind survey vessels, likely within 5 meters of the ocean surface (see Crocker and Fratantonio 2016). We assume that the lessees may use any or all of these HRG sources, but that the use of boomers, bubble guns, and sparkers will not be used by lessees on AUVs; so, this will not be further analyzed in this consultation.

For HRG survey devices that are associated with the use of AUVs, sound levels are expected to be concentrated at the sea floor, and not transmitted throughout the water column, reducing the risks of exposure to high levels of sound for ESA-listed marine mammals that may be in the vicinity of AUVs. For towed HRG surveys, the potential for exposure to noise that could result in PTS is further reduced by the Clearance Zone (600 m) and Shutdown Zone (500 m), and the use of PSOs to call for a shutdown of equipment operating within the hearing range of ESA-listed whales and sea turtles should they be detected. Given the bottom-orientation of HRG sound sources used with AUVs, and the shutdown requirements when ESA-listed marine mammals are sighted within 500 meters of towed HRG surveys, the risk of auditory injury occurring for any marine mammals from HRG surveys is extremely unlikely.

Ruppel et al. (2022) used physical criteria (e.g., sound source level, transmission frequency, directionality, beam width and pulse repetition rate) to analyze the effects of various HRG sources on marine mammals; specifically, whether the sound levels received by marine mammals cause certain behavioral responses. Four tiers were developed to inform regulatory evaluation. Tier 1 and Tier 2 include high-energy air guns, which are not included in the proposed action. Tier 4 includes most HRG sources, which are considered unlikely to result in the incidental take of marine mammals and are therefore considered *de minimis*. BOEM included in the proposed action for this consultation the use of AUVs, UTPs, USBLs, ADCPs, acoustic releases, ROVs, and similar technology in this category (BOEM 2024a). Tier 3 in Ruppel et al. (2022) included most non-airgun impulsive HRG seismic surveys, which may not meet the *de minimis* category without an analysis of factors such as radiated sound pressure levels, beam patterns, beam width, directionality, etc. Within Tier 3, BOEM is including medium penetration sub-bottom profilers as part of the proposed action, and is applying PDC 3 as its mitigation and monitoring, including required use of PSOs, shutdown and clearance zones for towed systems.

As summarized in the BA, the distances from the CHIRP sub-bottom profiler within which the onset of auditory injury is anticipated is 8.9 meters for baleen whales and 4 meters for toothed whales (e.g., sperm whales and SRKWs). For otariids (i.e., Guadalupe fur seals) the injury threshold is 6.5 meters. Even though the application of PDC 3 is not proposed for AUVs, the potential for injury to ESA-listed whales when the CHIRP sub-bottom profiler is deployed from an AUV is extremely unlikely, given the small injury threshold distance (less than 10 meters). In addition, since AUVs primarily operate in deeper waters and at depths of ~40 meters or less above the seafloor, with bottom-oriented directionality, the likelihood that an ESA-listed marine mammal will be anywhere near the sound source is extremely low.

For the multibeam echosounder (100 kHz), the onset of auditory injury is anticipated at a distance of only 0.1 meters for toothed whales, with no risk of injury to baleen whales and otariids (i.e., Guadalupe fur seals). BOEM is applying PDC 3 as its mitigation and monitoring, including required use of PSOs, shut-down and clearance zones for towed systems (Table 3). Even though the application of PDC 3 is not proposed for AUVs, the potential for injury to ESA-listed toothed whales when the multibeam echosounder is deployed from an AUV is extremely unlikely, given the small injury threshold distance (less than 1 meters), and expected operation near the seafloor with bottom-oriented directionality.

The general frequency range for vessel noise (10 to 1,000 Hz) overlaps with the generalized hearing range for blue, fin, sei, humpback (7 Hz to 36 kHz) and sperm whales (150 Hz to 160 kHz), and would therefore be audible to these species. Vessels without ducted propeller thrusters would produce levels of noise of 150 to 170 dB re 1 μPa-1 meter at frequencies below 1,000 Hz, while the expected sound-source level for vessels with ducted propeller thrusters level is 177 dB (RMS) at 1 meter (BOEM 2015, Rudd et al. 2015). The description of the proposed action did not specify whether vessels would have ducted propeller thrusters, but given that these ducted propeller thrusters produce louder sounds into the water column, we assume that vessels would use these thrusters in order to avoid underestimating the effects. For ROVs, source levels may be as high as 160 dB (BOEM 2021). Given that the noise associated with the operation of project vessels is below the thresholds that could result in injury (Table 8), no injury is expected.

Potential for TTS: As discussed earlier, marine mammals exposed to high intensity sound repeatedly or for prolonged periods of time can experience hearing threshold shift, which is the loss of hearing sensitivity at certain frequency ranges. Animals may experience TTS, in which their hearing threshold would recover over time, and thus, TTS is not considered an injury (NMFS 2024a). In general, TTS can last from a few minutes to days, be of varying degree, and occur across different frequency bandwidths, all of which determine the severity of the impacts on the affected individual. Thus, the impact of TTS depends on the frequency and duration of TTS, as well as the biological context in which it occurs. TTS of limited duration, occurring in a frequency range that does not coincide with that used for recognition of important acoustic cues, would have little to no effect on an animal's fitness. TTS of a sufficient degree can manifest as behavioral harassment, as reduced hearing sensitivity and the potential reduced opportunities to detect important signals (conspecific communication, predators, prey) may result in behavior patterns that would not otherwise occur. Repeated sound exposures that lead to TTS could cause auditory injury.

Table 8 shows the impulsive acoustic thresholds identifying the onset of TTS and auditory injury for marine mammal hearing groups. Exposure to high intensity sound pressure levels that may result in auditory injury versus TTS differ by around 6 dB re 1μPa, depending on the hearing group. While there is a low probability of temporary changes in hearing from exposure to some of the more intense sound sources associated with HRG, given the most recent data and guidance, animals would have to be very close and remain near sources for many repeated pings to receive overall exposures sufficient to cause the onset of TTS (NMFS 2024a; Finneran and Schlundt 2010). In other words, an animal would have to approach closer to the source or remain in the vicinity of the sound source appreciably longer to increase the received sound exposure levels. The mitigation and monitoring required in PDC 3 is intended to reduce the risk of behavioral disturbance to marine mammals exposed to high intensity sound associated with the HRG surveys; this level of protection will also minimize any risk of a marine mammal incurring TTS. While PDC 3 does not apply to HRG equipment operated from an AUV, AUVs primarily operate in deeper waters and at depths of ~40 meters or less above the seafloor, with bottom-oriented directionality. If behavioral responses typically include the temporary avoidance that might be expected (see below), the potential for TTS is extremely low so as to be discountable relative to the proposed operation of HRG survey equipment.

Masking: Masking is the obscuring of sounds of interest to an animal by other sounds, typically at similar frequencies. Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other sounds is important in communication and detection of both predators and prey (Tyack 2000). Although masking is a phenomenon which may occur naturally, the introduction of loud anthropogenic sounds into the marine environment at frequencies important to marine mammals increases the severity and frequency of the occurrence of masking. In the open ocean, ambient noise levels are between about 60 and 80 dB re 1 µPa in the band between 10 Hz and 10 kHz due to a combination of natural (e.g., wind) and anthropogenic sources (Urick 1983), while inshore noise levels, especially around busy ports, can exceed 120 dB re 1 µPa. When the noise level generated from an activity is above the sound of interest to marine life, and in a similar frequency band, masking could occur. This analysis assumes that any sound that is above ambient noise levels and within an animal's hearing range may potentially cause masking. However, the degree of masking increases with increasing noise levels; a noise that is just detectable over ambient levels is unlikely to cause any substantial masking.

The components of background noise that are similar in frequency to the signal in question primarily determine the degree of masking of that signal. In general, masking effects are expected to be less severe when sounds are transient (such as with HRG surveys) than when they are continuous. Masking is typically of greater concern for those marine mammals that communicate using low-frequency sound, such as baleen whales, because of the long distance these sounds propagate. Of the mobile HRG sources included in BOEM's proposed action, boomers, sparkers, bubble guns and the CHIRP sub-bottom profiler operate in the low to mid-frequency range (2.7 to 5.7 kHz). NMFS has previously concluded (86 FR 22160, 88 FR 48196, NMFS 2022) that marine mammal communications would not likely be masked appreciably by HRG surveys given the directionality of the signals for most HRG survey equipment types considered in this proposed action, and the brief period short duration of the period when an individual marine mammal is likely to be within its beam. Based on this, we conclude that any effects on masking of ESA-listed whales resulting from the proposed action will be insignificant.

Potential for Disturbance: The distances at which animals might be disturbed depend on the equipment and the species present (Table 12). The range of disturbance distances for all ESA-listed marine mammal species expected to occur in the proposed action area ranges from 223 to 499 meters, with sparkers producing the upper limit of this range. Given that the distance to the 160 dB re 1µPa rms threshold is less than the required Shutdown Zone (500 m), it is unlikely that ESA-listed whales will be exposed to potentially disturbing levels of noise during the surveys considered as part of the proposed action.

For the CHIRP sub-bottom profiler, the maximum disturbance distance for all whales and Guadalupe fur seals is 279 meters. We assume that for sub-bottom profilers used on towed systems, PSOs (and clearance and shut-down zones) will be employed to avoid significant behavioral responses of marine mammals exposed to the sound source from sub-bottom profilers.

The maximum disturbance distance from the multibeam echosounder (100 kHz) is 369 meters for toothed whales. Since high frequency sounds are outside of the hearing range of baleen whales and Guadalupe fur seals, we assume they would be unaffected and undisturbed. As mentioned earlier, sperm whales are primarily found in submarine canyons and deep waters offshore, and likely will not be exposed to a multibeam echosounder placed on an AUV in the 100 kHz frequency range. SRKWs however, are coastal species and could be exposed to sound pressure levels emitted by the echosounder, particularly when foraging and/or migrating between and within areas with high conservation value and in depth ranges of 200 meters or less, as described in the SRKW biological report to support revised critical habitat (NMFS 2021a). Satellite telemetry and acoustic detections of SRKWs showed high-use areas, primarily off the Washington outer coast with occasional use of areas off Oregon and California. Therefore, SRKWs could be present in the area where multibeam echosounders may be operating from an AUV.

Using NMFS' level B harassment isopleth calculator and the sound sources for operation of the AUV and UTP devices proposed by lessees, disturbance distance for marine mammals in one of the California plans was within 45-48 meters of the AUV and UTP devices. The AUVs are transitory and used intermittently for a few seconds at a time, and the acoustic sources are intended to map the seafloor, so sounds will be directionally facing downward. In addition, AUVs primarily operate in deeper waters and at depths of ~40 meters or less above the seafloor. Thus, marine mammal species such as SRKWs and humpback whales that are targeting pelagic prey such as salmonids, sardines, anchovies and herring will likely be undisturbed by AUVs and UTPs. If behavioral responses typically include the temporary avoidance that might be expected (see below), the potential for disturbance is extremely low so as to be discountable relative to the proposed operation of HRG survey equipment.

As determined in our interim guidance on the ESA term "harass" (NMFS 2016a), we interpret it to mean "create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering." We have determined that, in this case, the exposure to noise above the MMPA Level B harassment threshold (160 dB re 1µPa rms) will result in effects that are insignificant. We expect that the result of this exposure would result in, at worst, a temporary avoidance of the area with underwater noise louder than this threshold, which is a reaction that is considered to be of low severity with no lasting biological consequences (e.g., Southall et al. 2007). The noise sources of concern will be moving. This means that any co-occurrence between a whale, even if it is stationary, will be brief and temporary. Given that exposure will be short (no more than a few seconds, given that the noise signals themselves are short and intermittent and because the vessel towing the noise source is moving) and that the reaction to exposure is expected to be limited to changing course and swimming away from the noise source only far/long enough to depart the ensonified area (~500 m or less, depending on the noise source), the effect of this exposure and resulting response will be so small that it will not be able to be meaningfully detected, measured, or evaluated with respect to the effect to an animal's health and fitness; and therefore, is insignificant. As previously described, the use of HRG sources from AUVs will generally limit the range and extent of potential exposure of marine mammals to elevated sound levels given the bottom-orientation and directionality associated with those activities. Visual monitoring requirements of a 500-m exclusion zone for ESA-listed large whales, together with limited exposure to elevated sound levels and response for ESA-listed marine mammals that is anticipated, even if animals are not detected within the monitoring and exclusion zone, will ensure that any potential effects to these species related to disturbance from noise generated by HRG survey equipment from towed surveys will be reduced to insignificant levels.

Vessel noise has the potential to disturb marine mammals and elicit an alerting, avoidance, or other behavioral reaction. These reactions are anticipated to be short-term, likely lasting the amount of time the vessel and the whale or other marine mammal are in close proximity (Watkins 1981; Richardson et al. 1995; Magalhães et al. 2002), and not consequential to the animals. Additionally, short-term masking could occur. Masking by passing ships or other sound sources transiting the action area would be short term and intermittent, and therefore unlikely to result in any substantial costs or consequences to individual animals or populations.

Based on the best available information, ESA-listed whales and Guadalupe fur seals are either not likely to respond to vessel noise that is expected to be generated by the proposed action or are not likely to measurably respond to it in ways that would significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding or sheltering. Exposure will be generally short and temporary and any reaction to exposure to vessel noise is expected to be limited. The effect of this exposure and resulting response will be so small that it will not be able to be meaningfully detected, measured, or evaluated with respect to an animal's health and fitness, and therefore, is insignificant.

Table 8. Acoustic thresholds identifying the onset of temporary threshold shift (TTS) and auditory injury for marine mammals (NMFS 2024a).

Hearing Group	Generalized Hearing Range	TTS from Impulsive Sound	TTS from Non-Impulsive Sound	Onset of Auditory Injury from Impulsive Sound	Onset of Auditory Injury from Non-Impulsive Sound
Low frequency (e.g., Baleen Whales)	7 Hz to 36 kHz	216 dB Peak 168 dB cSEL	177 dB SEL	222 dB Peak 183 dB cSEL	197 dB cSEL
High-frequency (e.g., Toothed Whales)	150 Hz to 160 kHz	224 db Peak 178 dB cSEL	181 dB SEL	230 dB Peak 193 dB cSEL	201 dB cSEL
Very High frequency (e.g., Porpoise)	200 Hz to 165 kHz	196 dB Peak 144 dB cSEL	161 dB SEL	202 dB Peak 159 dB cSEL	181 dB cSEL
Phocid pinnipeds (True Seals) (underwater)	40 Hz to 90 kHz	217 dB Peak 168 dB cSEL	175 dB SEL	223 dB Peak 183 dB cSEL	195 dB cSEL
Otariid pinnipeds (Sea Lions and Fur Seals)	60 Hz to 68 kHz	224 dB Peak 170 dB cSEL	179 dB SEL	230 dB Peak 185dB cSEL	199 dB cSEL

Sea Turtles

In order to evaluate the effects of exposure to the survey noise by sea turtles, we rely on the available scientific literature. Sea turtles are low frequency hearing specialists, typically hearing frequencies from 30 Hz to 2 kHz, with a range of maximum sensitivity between 100 to 800 Hz (Ridgway et al. 1969; Lenhardt 1994; Bartol et al. 1999; Lenhardt 2002; Bartol and Ketten 2006). Currently the best available data regarding the potential for noise to cause behavioral disturbance come from studies by O'Hara and Wilcox (1990) and McCauley et al. (2000), who experimentally examined behavioral responses of sea turtles in response to seismic airguns. When exposed to sound pressure levels of around 175 to 176 dB re 1µPa (rms) in a shallow canal, loggerhead turtles exhibited avoidance behavior (O'Hara and Wilcox 1990), while McCauley et al. (2000) reported a noticeable increase in swimming behavior for both green and loggerhead turtles at received levels of 166 dB re 1 µPa. Both species displayed increased swimming speed and increasingly erratic behavior when sound pressure levels increased to 175 dB re 1µPa. Based on these two studies, we assume that sea turtles may exhibit a behavioral response when exposed to received levels of 175 dB re 1 µPa and higher (Table 9).

In order to evaluate the effects of exposure to the survey noise by sea turtles that may result in physical impacts, we relied on the available literature related to the noise pressure levels that would be expected to result in sound-induced hearing loss (i.e., TTS or PTS). We relied on the

U.S. Navy's programmatic approach (Phase III) evaluating the environmental effects of their military readiness activities and estimating the acoustic thresholds for PTS and TTS when sea turtles were exposed to impulsive sounds (U.S. Navy 2017).

In order to estimate received levels from airguns and other impulsive sources expected to produce TTS in sea turtles, the U.S. Navy compiled all sea turtle audiograms available in the literature in order to create a composite audiogram for sea turtles as a hearing group. Since these data were insufficient to successfully model a composite audiogram via a fitted curve as was done for marine mammals, median audiogram values were used in forming the hearing to TTS. Data from fishes were used since there is currently no data on TTS for sea turtles, and fish are considered to have hearing more similar to sea turtles than marine mammals (Popper et al. 2014). Assuming a similar relationship between TTS onset and PTS onset (considering the available data for humans and marine mammals), an extrapolation to PTS susceptibility of sea turtles was made based on methods proposed by Southall et al. (2007). From these data and analyses, dual metric thresholds were established similar to those for marine mammals, with one threshold based on peak SPL that does not incorporate the auditory weighting function nor the duration of exposure, and another based on 24-hour cumulative sound exposure (cSEL) that incorporates both the auditory weighting function and the exposure duration (Table 9).

Potential for Injury: None of the equipment being operated for these surveys that overlaps with the hearing range for sea turtles (30 Hz to 2 kHz) has source levels loud enough to result in auditory injury based on the peak or cumulative exposure criteria (Table 11). Therefore, physical effects to sea turtles are extremely unlikely to occur, and are discountable.

Potential for Disturbance: The distances at which sea turtles might be disturbed by survey equipment are listed in Table 12. The range of disturbance distances for all ESA-listed sea turtle species expected to occur in the proposed action area ranges from 40 to 90 meters, with sparkers producing the upper limit of this range.

As explained earlier, we assume that sea turtles would exhibit a behavioral response when exposed to received levels of 175 dB re 1µPa RMS that are within their hearing range (below 2 kHz). For boomers and bubble guns, the distance to this threshold is 40 m; for sparkers, the distance is 90 m; and for CHIRPs, the distance is 50 m. Therefore, a sea turtle would need to be within 90 m of the source to be exposed to potentially disturbing levels of noise. We expect that sea turtles would react to this exposure by swimming away from the sound source; this would limit exposure to a short time period, including the few seconds it would take an individual to swim away to avoid the noise.

The risk of exposure to potentially disturbing levels of noise is reduced by the use of PSOs to monitor for sea turtles. As required by PDC 3 (Appendix A of BOEM 2024a), a Clearance Zone of 600 m in all directions must be monitored for ESA-listed species during HRG surveys operating and towing equipment at a frequency of less than 180 kHz. At the start of a survey, equipment cannot be turned on until the Clearance Zone is clear for at least 30 minutes. This requirement is expected to reduce the potential for sea turtles to be exposed to noise that may be disturbing. Because the area where increased underwater noise will be experienced is transient and therefore will only be experienced in a particular area for a few seconds, we expect any effects to behavior to be minor and limited to a temporary disruption of normal behaviors, temporary avoidance of the ensonified area, and minor additional energy expenditure spent while swimming away from the area. As described earlier, mitigation and monitoring described in PDC 3 will not be required for HRG surveys using AUVs. The CHIRP sub-bottom profiler is the only HRG source that may be used on AUVs and may disturb sea turtles within a maximum of 50 meters of the sound source. Since AUVs primarily operate in deeper waters and at depths of ~12 meters or less above the seafloor, the likelihood that a sea turtle will be anywhere near the sound source is extremely low. Leatherbacks, loggerheads, and olive ridleys foraging off California are targeting prey in the mid to upper-water column, and would therefore not be disturbed by HRG sources operated by an AUV. Green turtles foraging primarily in southern California are targeting algae, eelgrass, and invertebrates in coastal bays, estuaries and near shallow waters.

Given the intermittent and short duration of exposure to any potentially disturbing noise from HRG equipment, major shifts in habitat use or distribution or foraging success are not expected. Effects to individual sea turtles from brief exposure to potentially disturbing levels of noise are expected to be minor and limited to a brief startle, short increase in swimming speed and/or short displacement, and will therefore have little to no effect on their health and fitness that can be meaningfully measured, detected or evaluated; and therefore, effects are insignificant.

Per Anderson (2021), ESA-listed turtles could be exposed to a range of vessel noises within their hearing abilities. Depending on the context of exposure, potential responses of leatherback and loggerhead sea turtles to vessel noise disturbance would include startle responses, avoidance, or other behavioral reactions, and physiological stress responses. Very little research exists on sea turtle responses to vessel noise disturbance. Currently, there is nothing in the available literature specifically aimed at studying and quantifying sea turtle response to vessel noise. However, a study examining vessel strike risk to green sea turtles suggested that sea turtles may habituate to vessel sound and may be more likely to respond to the sight of a vessel rather than the sound of a vessel, although both may play a role in prompting reactions (Hazel et al. 2007). Regardless of the specific stressor associated with vessels to which turtles are responding, they only appear to show responses (avoidance behavior) at approximately 10 m or closer (Hazel et al. 2007).

Therefore, the noise from project vessels is not likely to affect sea turtles from further distances, and disturbance may only occur if a sea turtle hears a vessel nearby or sees it as it approaches. These responses appear limited to non-injurious, minor changes in behavior based on the limited information available on sea turtle response to vessel noise.

For all of these reasons, vessel noise that is expected to be generated by the proposed action is expected to cause only minimal disturbance to sea turtles. If a sea turtle detects a vessel and avoids it or has a stress response from the noise disturbance, these responses are expected to be temporary and only endure while the vessel transits through the area where the sea turtle encountered it. Therefore, sea turtle responses to vessel noise disturbance are considered insignificant (i.e., so minor that the effect cannot be meaningfully evaluated), and a sea turtle would be expected to return to normal behaviors and stress levels shortly after the vessel passes by the animal.

Table 9. Impulsive acoustic thresholds identifying the onset of PTS, TTS and behavioral response for sea turtles (U.S. Navy 2017).

Hearing Group	Generalized Hearing Range	PTS Onset	TTS Onset	Behavioral Response
Sea Turtles	30 Hz to 2 kHz	232 dB re 1μPa Peak 204 dB re μPa^2-sec cSEL	226 dB re 1 μPa Peak 189 dB re 1 μPa^2-sec cSEL	175 dB re 1 μPa (rms)

Marine and Anadromous Fish and Invertebrates

To date, studies indicate that hearing ranges of most marine and anadromous fishes do not extend below 50 Hz or above 4 kHz (Mann et al. 2001, Kasumyan 2005, Chapuis et al. 2019). Hearing in the infrasound (<20 Hz) range has been documented for a few species, including Atlantic salmon (Knudsen et al. 1992) and Atlantic cod (Astrup and Møhl 1998). Hearing in the ultrasound range (>20 kHz) is currently only documented in clupeids (e.g., herrings, shads) and Atlantic cod (Mann et al. 2001), with the highest frequency physiological sensitivity in American shad (180 kHz; Mann et al. 1998). However, hearing thresholds for less than 100 fish species (~0.3% of known fish species) have been determined, and this does not include all ESA-listed species expected to be within the action area (Kasumyan 2005, Neenan et al. 2016; Table 10). Many fish species, including salmonids and sturgeon species, are well adapted to detecting lower frequency sounds (<1 kHz), which overlap with sound frequencies from activities such as shipping or dredging (Neenan et al. 2016). Fishes residing in environments where there is little light, such as the deep sea, may have a greater reliance on sound to sense their environments (Marshall 1967); however, ESA-listed fish species are unlikely to be found in the deep sea portions of the action area.

Many fish species sense particle motion rather than sound pressure; however, some fish species wherein the swim bladder is directly involved in hearing (e.g., clupeids) can detect both types

(Popper et al. 2019). Fishes with a swim bladder generally have better sensitivity to sound and can detect higher frequencies than fishes without a swim bladder (Popper & Fay 2011; Popper et al. 2014). Salmonids and green sturgeon have swim bladders, but are likely to only sense particle motion, so these species may have roughly similar hearing ranges. Hearing for some of these species have been studied but full hearing ranges are not yet established (Table 10). Eulachon do not possess a swim bladder (Gustafson et al. 2022), which likely makes them comparatively less sensitive to noise impacts; however, the hearing range for this species is currently unknown.

Recent studies have revealed that a wide diversity of invertebrates are also sensitive to sounds, especially via sensory organs whose original function is to allow maintaining equilibrium in the water column and to sense gravity (Solé et al. 2023). Some invertebrates change their behavior when exposed to chronic shipping noise (Murchy et al. 2019). Cephalopods (Packard et al. 1990) and crustaceans (Heuch and Karlsen 1997) possess acute infrasound sensitivity, while some bivalves can detect sound over a range similar to many fishes (e.g., 30 - 1000 Hz; Solé et al. 2023). Hearing thresholds for sea stars (members of phylum echinodermata) have not yet been established, although Solan et al. (2016) demonstrated that some echinoderms can detect sounds.

Table 10. Hearing range of ESA-listed fish species in the action area or related species (sources listed within table) as well as criteria for onset of injury and behavioral response due to impulsive acoustic noise sources (FHWG 2008).

Species	Generalized Hearing Range	Onset of Injury	Behavioral Response
Chinook Salmon (smolts)	At least 100 - 600 Hz (Halvorsen et al. 2009)	Peak SPL: 206 dB re 1µPa; SELcum: 187 dB re 1µPa2-sec	150 dB re 1µPa
Rainbow trout/steelhead	At least 100 - 600 Hz (Wysocki et al. 2007b)	Peak SPL: 206 dB re 1µPa; SELcum: 187 dB re 1µPa2-sec	150 dB re 1µPa
Atlantic Salmon	At least 10 - 800 Hz (Harding et al. 2016)	Peak SPL: 206 dB re 1µPa; SELcum: 187 dB re 1µPa2-sec	150 dB re 1µPa
Sturgeons (*Acipenser spp.*)	At least 100 - 1000 Hz (Popper et al. 2005)	Peak SPL: 206 dB re 1µPa; SELcum: 187 dB re 1µPa2-sec	150 dB re 1µPa

There are no criteria developed for considering noise effects to ESA-listed fish or invertebrates from geophysical and geotechnical surveys such as those in the proposed action. However, for seismic survey impulse sources (e.g., boomers, sparkers), it is reasonable to use the criteria developed for impact pile driving and explosives when evaluating the effects of exposure of fish to this equipment. Unlike pile driving, however, which produces repetitive impulsive noise in a single location, the geophysical survey sound sources are moving; therefore, the potential for repeated exposure to multiple pulses is much lower when compared to pile driving. We expect those ESA-listed fish (and sharks) exposed to noise disturbance to move away from the sound source; however, avoidance may not always occur. NMFS' observations during impact pile driving activities indicate salmonids startle but may not necessarily flee from the noise source, and at times move toward pile driving to seek shelter (personal communication, Mike Kelly, 2020). Depending on the direction a given fish and the noise source move in relation to one another, exposure may be very brief or prolonged. NMFS currently does not use criteria for determining effects to invertebrates from impulsive noise sources.

Potential for Disturbance: We use 150 dB re 1 μPa rms as a threshold for examining the potential for behavioral (or disturbance) responses by individual ESA-listed fish to noise with a frequency less than 1 kHz. This is supported by information provided in a number of studies (Andersson et al. 2007, Wysocki et al. 2007a, Purser and Radford 2011). Responses to temporary exposure of noise above this threshold is expected to be a range of responses indicating that a fish detects the sound (brief startle responses) or may completely avoid the area ensonified above 150 dB re 1μPa rms. Popper et al. (2014) does not identify a behavioral threshold but notes that the potential for behavioral disturbance decreases with distance from the source. BOEM (2024a) estimated behavioral response distances for fish exposed to HRG survey noise sources, which includes large distances for some equipment (Table 12). However, as HRG equipment typically operates at frequencies above 1 kHz, the NMFS criteria (described above) does not apply. Equipment included in the proposed action that is expected to produce noise below 1 kHz, which is within the approximate hearing range of most ESA-listed fish species, includes survey vessel and AUV/ROV propulsion and positioning as well as geotechnical sampling.

Vessel traffic and AUVs involved with project activities within the action area may startle individual fish on the rare occasion when noise associated with propulsion comes into close proximity of individuals. Disturbance from this noise is expected to primarily occur in the upper water column, as well as within bays and harbors that may be used as ports for survey vessels from the lower Columbia River to Port Hueneme, California. AUVs will be used primarily close to the seafloor within the WEAs and along the deeper portions of potential cable routes to shore. AUV noise will primarily affect ESA-listed fish and invertebrates that are associated with the benthos; this would typically include green sturgeon and sunflower sea star, but also any salmonids, eulachon, black abalone, or white abalone near the seafloor in shallower portions of the action area.

We assume that geotechnical sampling will be brief and limited to deep water where exposure to ESA-listed fish species is not expected. ESA-listed fish exposure to noise from survey vessels and AUVs/ROVs is expected to be brief because these sources will be moving, which will not likely disrupt normal behavior patterns of listed species for extended periods, nor affect their fitness or subsequent survival. Therefore, NMFS expects that noise-induced changes in behavior of listed marine fish, sharks and invertebrates to be insignificant.

Potential for Injury: Injury and mortality is only known to occur when fish are very close to the noise source, and the sound is very loud and typically associated with pressure changes, such as with impact pile driving or blasting. The Fisheries Hydroacoustic Working Group (FHWG) was formed in 2004 and consists of biologists from NMFS, USFWS, the Federal Highway Administration, the Corps, and the California, Oregon and Washington Department of Transportation, supported by national experts on underwater sound producing activities that affect fish and wildlife species of concern. In June 2008, the agencies signed a memorandum of agreement documenting interim criteria for assessing the physiological effects of impact pile driving on fish (FHWG 2008). The interim criteria were developed for the acoustic levels at which the onset of physiological effects to all fish species could be expected.

The interim criteria are: Peak SPL: 206 dB re 1µPa; SELcum: 187 dB re 1µPa2-sec for fish 2 grams or larger; and SELcum: 183 dB re 1µPa2-sec for fish less than 2 grams. The use of the 183 dB re 1µPa2-sec cumulative SEL is not appropriate for this consultation because all ESA-listed fish within the action area are larger than 2 grams. Currently, these criteria represent the best available information on the thresholds at which physiological effects to ESA-listed marine fish are likely to occur. We note that physiological effects may range from minor injuries from which individuals are anticipated to completely recover with no impact, to fitness to significant injuries that may lead to death. The severity of injury is related to the distance from the noise source as well as the duration of the exposure. The closer to the source and the longer duration of the exposure, the higher likelihood of significant injury.

While active acoustic benthic surveys are widespread, relatively few studies examine the effects of HRG equipment used in seafloor habitat mapping (e.g., echosounders, sonars, and related technologies) on fishes and invertebrates (Mooney et al. 2020). As previously described, the hearing range of most fish and invertebrates, including ESA-listed species in the action area, is below 1 kHz. High frequency (>100 kHz) equipment expected to be used for habitat mapping (e.g., multi-beam or side-scan sonar) is non-impulsive and not expected to overlap with hearing frequencies of most fish and invertebrate species, including ESA-listed species, in the action area. Impulsive sound sources can cause impacts to fish and invertebrates even outside of their hearing ranges. Although sound levels for all HRG survey equipment summarized by BOEM (2024a) exceed NMFS criteria for injury to fish (Table 11), habitat mapping equipment is not considered impulsive so the NMFS criteria would not apply. Despite the paucity of data on this subject, available scientific information does not suggest injury to fish or invertebrate species is likely from high-frequency HRG activities used in habitat mapping.

Impacts to fish from seismic or impulse sources used in geophysical surveys, such as boomers and sparkers, are not well understood (Mooney et al. 2020). Sound levels for all HRG seismic survey equipment summarized by BOEM (2024a) exceed NMFS criteria for injury to fish (Table 10). BOEM (2024a) indicated that physical injury to fish could occur within a short distance from impulses from boomers or bubble guns (3.2 m; 10 ft) and sparkers (9 m; 30 ft), but physical injury distance for CHIRP sub-bottom profilers was not estimated (Table 11). The method used by BOEM (2024a) to derive the onset of injury estimates in Table 11 was not specified, including which sound level characterization type, Peak or cumulative (i.e., SEL), was used. However, NMFS determined the distance for onset of injury to fish is greater for Peak than cumulative sound levels for mobile seismic sources (e.g., boomers and sparkers). Using Peak sound levels indicated for boomers and sparkers in BOEM (2024a), and the Peak SPL threshold for fish (206 dB), NMFS estimated onset of injury distances for fish equivalent to those presented in BOEM (2024a).

Based on these estimates, fish could be harmed by operation of boomers, bubble guns, or sparkers if they are close enough to the noise source. Although some sub-bottom profilers are expected to be onboard AUVs, and therefore operating near the seafloor, we assume boomers and sparkers will be towed behind survey vessels, likely within 5 meters of the ocean surface (Crocker and Fratantonio 2016). Although it is not certain which ESA-listed fish species will overlap spatially and temporally with seismic surveys operating within the WEAs and potential cable routes, we expect that overlap could occur with fish species listed in Table 7. Salmonids are expected to migrate and feed primarily in the upper water column, and could be very near the surface at times, therefore individuals could be within the impact range of towed seismic equipment. Although salmonids could occur in the proposed WEAs, they are much more common in the nearshore ocean environment. We assume that seismic equipment would primarily be used in WEAs rather than along cable routes in the nearshore ocean, which would reduce the chance of exposure for salmonids. Eulachon are not expected to be common in offshore waters, and therefore are unlikely to be impacted by proposed activities within the WEAs. Green sturgeon (if present) typically occur near the seafloor in the ocean, and therefore are expected to be beyond the impact range of any towed seismic equipment such as boomers or sparkers. Scalloped hammerhead shark, oceanic whitetip shark, and giant manta ray could be present in offshore waters where noise impacts could occur; however, these species are expected to be exceedingly rare in the action area due to their preference for warmer waters outside the action area.

BOEM (2024a) did not analyze potential impacts to sunflower sea stars from noise; rather indicating this species occurs at depths too shallow to overlap with noise impacts. Sunflower sea star has been observed at depths beyond 435 m offshore of Oregon and central California, with a gradual decline through ~600 m and sporadic occurrence to a maximum depth of 1,158 m (3,799 ft; e.g., Keller et al. 2008). This depth range could overlap with WEAs, but could certainly overlap with shallower survey areas within potential cable routes. Although the distance for onset of physical injury is unknown for this species, sunflower sea stars occur on the seafloor, making it less likely they would be within range of injurious noise produced by towed seismic equipment. Seismic equipment operating on AUVs would be close to the seafloor (~20m), but we do not expect impacts from this equipment that operates at lower levels and higher frequencies than boomers or sparkers. Few studies exist on potential for injury to invertebrates from noise sources in the proposed action. Naval ordnance was detonated and found to kill abalone in close proximity (Aplin 1947); however, we expect sound impulse waveforms and amplitudes used in HRG surveys to be much less detrimental than those found in the Aplin study.

NMFS does not expect there to be any injuries to ESA listed fish, sharks, abalone, or sunflower sea stars due to the intermittent use of boomers, bubble guns, or sparkers, which are the instruments likely to cause the highest levels of impulsive acoustic noise. All of the other survey techniques or instruments produce sounds that ESA-listed fishes or invertebrates in the action area would not likely be able to detect. Sparkers or boomers would be deployed at sampling stations spaced 1-2 km apart, leaving short periods of time in between deployments. Based on BOEM's analysis, for an individual fish to be injured, they must be present within 9 meters (or less) of the noise source. NMFS does not expect listed fish (or sharks) to be present within 9 meters of sparkers given the intermittent and pulsed character of deployments occurring in the WEAs. Although we do not have criteria for determining noise effects to invertebrates, NMFS does not expect any injury to occur for black abalone, white abalone, or sunflower sea stars. Exposure to near-source noise impacts from boomers or sparkers, which we assume will be towed at the surface in deep water, is not expected to reach the area where benthic invertebrates such as sunflower sea stars occur. Therefore, NMFS anticipates the possibility of injuries or mortalities to ESA-listed fish or sunflower sea stars to be discountable.

Table 11. Onset of auditory injury distances (in meters) for marine mammals, PTS distances for sea turtles, and onset of physical injury distances for fish from mobile HRG sources towed at 4.5 knots for impulsive and non-impulsive sources (BOEM 2024a). Distances are based on the source level characterization metric (i.e., SEL, RMS, or Peak) of greatest impact for each taxa. NA reflect that criteria for impacts to turtles and fish from non-impulsive sources are not available, and situations where the frequency of sounds produced by equipment do not overlap the hearing ranges associated with species/group.

HRG Source (Maximum Frequency)	Highest Source Level (dB re 1 µPa)	Low Frequency (e.g., baleen whales)[1]	High Frequency (e.g., dolphins, sperm whales)[1]	Very High Frequency (e.g., porpoises)	Phocids (true seals)	Otariids (sea lions, fur seals)	Sea Turtles	Fishes
Boomers, Bubble Guns (4.3 kHz)	176 dB SEL 207 dB RMS 216 peak	1.2	0.1	38.9 *	1.3	0.7	0	3.2
Sparkers (2.7 kHz)	188 dB SEL 214 dB RMS 225 peak	20.9	1.4	130.5 *	19.8	6.7	0	9
Chirp Sub Bottom Profilers (5.7 kHz)	193 dB SEL 209 dB RMS 214 peak	8.9	4	102.9 *	17.1	6.5	NA	NA
Multi-beam echosounder (100 kHz)	185 dB SEL 224 dB RMS 228 peak	0	0.1	23.4*	0	0	NA	NA
Multi-beam echosounder (>200 kHz)	182 dB SEL 218 dB RMS 223 peak	NA	NA	NA	NA	NA	NA	NA
Side-scan sonar (>200 kHz)	184 dB SEL 220 dB RMS 226 peak	NA	NA	NA	NA	NA	NA	NA

[1] Auditory injury onset distances were calculated with NOAA's sound exposure spreadsheet tool (NMFS 2024a) using sound source characteristics for HRG sources in Crocker and Fratantonio (2016). Repetition rates used to calculate PTS injury distances using the NOAA tool were estimated for water depth of 100 m.

* This range is conservative as it assumes full power, an omnidirectional source, and does not consider absorption over distance.

NA = not applicable due to the sound source being out of the hearing range for the group. RMS = root mean square. SEL = sound exposure level.

Table 12. Maximum disturbance distances (in meters) for marine mammal and sea turtle hearing groups from mobile HRG sources towed at 4.5 knots for impulsive and non-impulsive sources (BOEM 2024a). Also included is the behavioral response distance (meters) for fish from an impulsive source (BOEM 2024a). NA reflect that criteria for impacts to fish from non-impulsive sources (e.g., multi-beam) are not available, and situations where the frequency of sounds produced by equipment do not overlap the hearing ranges associated with species/group.

HRG Source	Low Frequency (e.g., baleen whales)[1]	High (e.g., dolphins, sperm whales)[1]	Very High Frequency (e.g., porpoises)	Phocids (true seals)	Otariids (sea lions, fur seals)	Sea Turtles	Fishes
Boomers, Bubble Guns (4.3 kHz)	223	223	223	223	223	40	699
Sparkers (2.7 kHz)	499	499	499	499	499	89	1,567
Chirp Sub bottom Profilers (5.7 kHz)	279	279	279	279	279	50	NA
Multi-beam Echosounder (100 kHz)	NA	369	369	NA	NA	NA	NA
Multi-beam Echosounder (>200 kHz)	NA	NA	NA	NA	NA	NA	NA
Side-scan Sonar (>200 kHz)	NA	NA	NA	NA	NA	NA	NA

[1]Auditory disturbance distances were calculated with NOAA's sound exposure spreadsheet tool (NMFS 2024a) using sound source characteristics for HRG sources in Crocker and Fratantonio (2016).
NA = not applicable due to the sound source being out of the hearing range for the group.

Entanglement in ROV Cables or Metocean Buoy and ADCP Moorings

As described in the BA, BOEM anticipates up to six buoys will be deployed in and near to each leased area in the California WEAs, for a possible total of 30 buoys (for 5 leases) (BOEM 2024). In addition, there is potential for up to 50 additional ADCP moorings to be deployed, if ADCP aren't incorporated into metocean buoy mooring systems directly. For this proposed action, NMFS considers the likelihood that any ESA-listed species could become entangled in ROV cables or metocean buoy and ADCP mooring lines given that marine mammals and sea turtles are documented as being entangled in lines and other gear throughout the world, and off the U.S. West Coast (including within the action area). The type/size of line used and the relative size/weight of the buoy and anchors for the proposed action are different from what is typically used in the U.S. West Coast fixed gear fisheries, in that somewhat heavier line and much larger and heavier gear is involved with deployment of metocean buoys. BOEM anticipates the PNNL LiDAR buoy that employed a 4,990 kilogram anchor, chain, jacketed wire, nylon rope, and subsurface floats to maintain tensions from taut to semi-taut would be similar to those associated with the proposed action (PNNL 2019). As described earlier, ADCPs may be associated with metocean buoy systems, although they may also be independently mounted on the seafloor. These independent configurations are expected to constitute a relatively low profile off the bottom, as they aren't designed or intended to be suspended all the way to the surface.

In spite of the differences between fishing gear and the equipment proposed for use, in order to avoid underestimating the effects of this action we will assume that entanglement risks of any vertical line placed in the water are relatively similar to that of fixed gear fisheries and other known sources of entanglements on the U.S. West Coast. We also consider that the proposed use of gear (i.e. cables associated with buoys) has been involved with entanglements in the past (see more information below), and there is limited information available to improve our ability to more precisely distinguish their risk from other sources of entanglements at this time. Given this, we consider the difference in the relative scale of effort of fixed gear fisheries along the U.S. West Coast that are known to entangle ESA-listed species compared to the proposed action in terms of the combination of the number of vertical lines associated with anchors that are in the water and the length of time those lines are in the water. Reported entanglements on the U.S. West Coast have primarily been associated with fixed fishing gear, yet entanglements with other types of gear and or equipment do occur (e.g., Waverider buoy).

NMFS WCR has been responding to and tracking the entanglement of whales through reports received through the WCR Marine Mammal Health and Stranding Response Program (MMHSRP). Data from 1982-2017 illustrates the magnitude of this risk to whales throughout the U.S. West Coast with 429 reports of entangled whales confirmed, with an average of 12 annual confirmed reports over the thirty-five-year time period analyzed, and reported increases since 2010 (Saez et al. 2021). The authors noted that reported entanglements do not necessarily indicate where the interaction occurred, but where it was observed and subsequently reported. 85 percent of confirmed entanglements from the U.S. West Coast were reported off California, while only 6 percent originated in waters off Oregon. Between 1982 and 2017, coastal waters of Central California, including the port of San Francisco/Oakland, produced 134 confirmed reports of large whale entanglements. Confirmed entanglement reports along the U.S. West Coast from 1982-2017, document 7 entangled blue whales (all between 2015-2017), 7 entangled fin whales, 208 entangled gray whales (elevated in the mid-1980s and from 2012-2017, on average), 165 entangled humpbacks (significantly elevated from 2014-2017), 3 entangled killer whales, and 14 entangled sperm whales (10 documented in the California drift gillnet fishery). Humpbacks are most often detected and confirmed as entangled in central California, with 66 animals reported entangled between 2014 and 2017. For the entire WCR over 35 years, when the entangling gear was identified, humpback whales were confirmed to be entangled with pot gear in 73% of the 167 cases reported over that time period (Saez et al. 2021). While entanglement data from more recent years (2018-2023) has not been comprehensively summarized in a similar form, a review of the annual entanglement summaries available from the WCR indicate these patterns have remained consistent.[5]

In 2014, a humpback whale was reported entangled in a Waverider buoy (also a wave measurement buoy) deployed offshore of the Monterey Bay area (approx. 25 miles) in deep water (>500 fathoms). In this instance, the entanglement was described as a humpback whale "caudal peduncle wrapped in bungie between 10 ft chain and line that runs to 300 lb anchor" (NMFS unpublished stranding data). Subsequent follow up with the entanglement response team indicated that this buoy mooring system included the apparent presence of significant amounts of slack line and bungee that was involved in the entanglement. In 2019, a second entanglement of a humpback whale associated with a Waverider buoy occurred. In this instance the whale already had fishing gear (crab pot) wrapped around the caudal peduncle. The preliminary data shows that the trailing fishing gear then became entangled around the buoy mooring line – which we define as secondary entanglement (NMFS unpublished stranding data). To our knowledge, these events represent the only entanglements associated with wave buoys or other similarly deployed scientific oceanographic equipment along the U.S. West Coast since at least 1975 when the program involved with these buoys began.

Secondary entanglements are not extremely rare on the U.S. West Coast. NMFS WCR unpublished stranding data includes reports that indicate multiple gear types attached to entangled whales indicating that some (primarily) entangled whales become entangled in additional gear (secondary entanglement). WCR MMHSRP records documented at least 17 secondary entanglements from 2014-2020, all of which primarily had buoys and associated lines from various fixed gear fisheries and two ocean monitoring buoys as previously discussed. It is likely that numerous other entanglements reported have involved secondary entanglements, but the level of documentation obtained did not allow for confirmation that multiple pieces of gear were involved.

All of the available information previously described relates to the presence of whales interacting with fixed gear in this region, and the potential risk of both primary and secondary entanglement of whales with project gear, including the metocean buoys, and any additional moorings for ADCP, used for this proposed action.

Currently, it is not possible to evaluate the absolute risk of entanglement posed by any specific lines or mooring systems deployed anywhere in the ocean. However, by using estimates of the total number of vertical lines and the duration of their deployment as an index of entanglement

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[5] https://www.fisheries.noaa.gov/west-coast/marine-mammal-protection/west-coast-large-whale-entanglement-response-program#reports

potential, we can approximate the relative risk associated with the proposed action by comparing it to the reported rate of entanglement in U.S. West Coast fixed gear fisheries. In previous consultations on deployment of ocean monitoring buoys and other similar gear (e.g., NMFS 2016b; NMFS 2017; NMFS 2019, NMFS 2022), NMFS has used this information to examine the number of line-days associated with a proposed action as a proxy for the likelihood of entanglements occurring for ESA-listed species.

Although specific estimates of the number of lines in the water are not available for U.S. West Coast fixed gear fisheries, it is expected that over 400,000 traps/lines may be deployed just in the Dungeness crab fishery alone along the U.S. West Coast based on the allowable trap limitation programs that exist in California, Oregon, and Washington, where one trap corresponds to one "buoy line" (i.e., one vertical line attached to pot/trap connected to a buoy). There are numerous other fixed gear fisheries that deploy similar gear as well, further increasing the total exposure of vertical lines in the water to ESA-listed species across the U.S. West Coast well into the tens (10's) of millions of line-days over the course of a year, at least. We have noted that the entanglements of ESA-listed species such as whales and sea turtles along the U.S. West Coast that are reported each year are on the order of tens (10's) of animals each year; generally, between 20 and 60 each year since 2014 (NMFS 2024). While there are numerous origins associated with these entanglements, we have been able to identify the origin of ~50% of these reported entanglements in recent years, and the origins are most commonly associated with U.S. West Coast fixed gear fisheries (Saez et al 2021). Consequently, we can assume a rough indicator of relative entanglement risk associated with any given line-day assuming 10's of reported entanglements per year in U.S. West Coast fixed gear fisheries results from tens of millions of line-days per year, at least.

For comparison, we calculate the number of line-days per year for the proposed action. This calculation, applied to the projected 5-year duration for metocean buoys deployment (5 x 365 days) results in a maximum of 1,825 days. Up to 30 metocean buoys, and 50 independent ADCP mooring lines deployed for 1,825 days results in 146,000 line-days for this component of the proposed action. As a result, we conservatively estimate that the resulting entanglement risk from metocean and ADCP deployment is very low considering that the number of line-days over this five-year deployment is extremely small compared to what is associated with U.S. West Coast fixed gear fisheries.

Importantly, we note this general approach is likely an overestimate of risk, more reflective of the risk of entanglements with the lines associated with West Coast fixed fishing gear, which differ from the lines and gear associated with the proposed action. In addition, it is likely that some, if not most, of the ADCP moorings will be deployed in association with the metocean buoy configurations, and these are much lower profile mooring system deployments that are not expected to extend far through the water column. The metocean buoys and ADCP mooring have been designed to minimize the risk of entanglements, and their proposed use includes measures that further mitigate entanglement risk compared to standard lines used with fishing gear. In addition, BOEM's PDC 5 and its related BMPs are designed to reduce the risk of ESA-listed species' potential entanglement in mooring systems. These mitigation measures include: 1) monitoring a clearance zone of 600 m around the ROVs for a duration of 30 minutes to ensure the absence of protected species; 2) using the best available mooring systems with all buoy lines attached to the seafloor, including anchor lines (i.e., ensuring the designs prevent any potential entanglement of ESA-listed species, considering the safety and integrity of the structure or device); and 3) using the shortest practicable lengths, rubber sleeves for rigidity, weak-links, chains, cables, coated rope systems, or similar equipment types that prevent lines from looping, wrapping, or entrapping protected species. For all mooring system deployment and retrieval, equipment will be lowered and raised slowly to minimize risk to ESA-listed species and benthic habitat. Furthermore, monitoring for ESA-listed species in the area prior to and during deployment and retrieval work will ensure that work will be stopped if ESA-listed species are observed within 500 m of the vessel.

Based on the very small number of entanglements that have been documented with ocean measurement buoys in the past (2 reported in the last 40 years), with one of those being a secondary entanglement (1982-present; NMFS-WCR MMHSRP), combined with the design features included with the proposed metocean buoys, we conclude that the risk of entanglements with metocean buoys and ADCP moorings is less than the already very low risk assumed in our line-day order of magnitude analysis.

Given the very low probability that an entanglement would be expected to occur with any type and number of lines deployed for the length of the time proposed, combined with the construction and design of the metocean buoys and ADCP moorings, and the use of PDC 5 (Appendix A (BOEM 2024a)), we conclude the risk of ESA-listed species becoming entangled with metocean buoys and ADCP moorings is extremely unlikely; and therefore discountable.

Accidental Release of Pollutants and Marine Debris

As described in the PDC 2, Appendix A BOEM (2024a), "marine debris" is defined as any object or fragment of wood, metal, glass, rubber, plastic, cloth, paper or any other solid, man-made item or material that is lost or discarded in the marine environment by the lessee or an authorized representative of the lessee while conducting activities on the OCS in connection with a lease, grant, or approval issued by the Department of the Interior. Marine debris can raise the risk of entanglement to protected species under some circumstances and conditions. Due to this possibility, BOEM's Marine Debris Awareness and Prevention PDC 2 (BOEM 2024a) includes the training of staff, marking of gear from the proposed action, recovery of identified marine debris, and subsequent timely reporting. With respect to gear marking, all lessees are required to make durable identification markings on equipment, tools, containers (especially drums), and other material (30 CFR 250.300(c)). Also, the presence of marine debris adds to the risk of ingestion of these items by protected resources; for this reason, the recovery of marine debris is identified as a best management practice.

BOEM requires lessees to recover marine debris that is lost or discarded while performing OCS activities in order to avoid entanglement or ingestion by marine species. BOEM has addressed these increased risks by the potential presence of marine debris in their PDC 2 (Appendix A BOEM 2024a) on the proper storage and disposal practices at-sea to reduce the likelihood of accidental discharge of marine debris. These PDCs and BMPs reduce the risk of ESA-listed species ingestion and entanglement to discountable levels.

Metocean buoys need a power source to take measurements of interest to inform the site assessments, and this can be from multiple sources including solar or diesel fuels. As diesel fuel is of lesser density than seawater, it may float atop the water's surface if released during the proposed project, and is expected to dissipate rapidly, evaporate, and biodegrade within a few days (MMS 2007).

In the unlikely event of an accidental oil or chemical spill from potential sources of chemical pollution related to the proposed action from collisions with the metocean buoy and/or a spill during fuel transfer to the generator on the metocean buoy, there is risk of contaminants entering U.S. waters. USCG (2011) characterized the average fuel spill size from 2000-2009 for vessels, other than tank ships and barges, at 88 gallons; and BOEM assumes a similar volume for this analysis. The volume anticipated would dissipate and reach a concentration of 0.05 percent, in 0.5-2.5 days dependent on wind; which would limit the impacts to the environment from a similar spill, if it were to occur. For these reasons, we consider the risk of contaminants entering the waters of the United States to be discountable and insignificant.

Benthic Disturbance and Turbidity

In total, anchors for UTPs, ADCPs, and metocean buoys, anchor chain sweep/chafe, and geotechnical and benthic sampling are anticipated to impact as much as 104,420 m^2 of the bottom. These activities will likely cause suspended sediments and elevated levels of turbidity for brief periods of time. Larger contacts with the bottom, such as metocean buoy anchors, may cause a slightly higher magnitude and duration of elevated turbidity in the benthic portion of the water column. These larger anchors may also cause scour of the surrounding seabed, which would also increase suspended sediments and turbidity in the benthic portion of the water column. Scour may occur around anchors and produce elevated turbidity during periods of higher current.

Within the WEAs, NMFS expects small numbers of salmonids (juvenile, sub-adult, and adult life stages), as well as most life stages of sunflower sea stars, to be present. Scalloped hammerhead shark, oceanic whitetip shark, and giant manta ray are expected to be exceedingly rare in the WEAs due to their preference for warmer waters outside the action area. Any salmonids, scalloped hammerhead shark, oceanic whitetip shark, or giant manta ray within the WEAs would use habitats in the water column at or near the surface, where effects from benthic disturbance (including turbidity) would not extend, therefore impacts are discountable for these species. Any individual sunflower sea star exposed are expected to be attracted to the turbid conditions for feeding opportunities, or temporarily avoid these areas until turbidity ameliorates. Given the low abundance of sunflower sea stars where most bottom contacts would occur in the WEA, NMFS does not anticipate any direct effects (crushing) to individuals. The temporary changes to water quality conditions are not expected to have any negative fitness consequences to sunflower sea stars due to changes in behavior and are therefore insignificant.

Within the export cable route corridors and nearshore areas, larger numbers of salmonids (juvenile, sub-adult, and adult) and sunflower sea stars (all life stages) are expected to be present and exposed compared to the WEAs. SDPS green sturgeon, SDPS Pacific eulachon, and black abalone are also expected to be exposed to bottom disturbance activities occurring closer to shore along the cable routes. Distribution of white abalone does not overlap areas where turbidity or bottom disturbance could occur within the action area. Green sturgeon and Pacific eulachon are sparsely distributed in the nearshore marine environment, and are therefore unlikely to be impacted by benthic disturbance. Turbidity and benthic disturbance impacts within the nearshore environment are expected to be small in size relative to the action area, and allow for individual animals to select areas that have not been disturbed. The intensity of bottom sampling in the cable route corridors is expected to be less than the sampling rates required in the WEAs. Due to low sampling rates and limited footprint for benthic disturbance in the nearshore area, impacts to green sturgeon, Pacific eulachon, and salmonids are considered insignificant. The low sampling intensity proposed in the nearshore portion of the action area, combined with the proposed 40-ft buffer for hard substrates and low species abundance, makes any likelihood of crushing sunflower sea stars or black abalone during sampling or anchoring discountable.

The primary prey of leatherback sea turtles, jellyfish, relies upon the need for hard substrate during the benthic stage (polyp) of their life cycle (Suchman and Brodeur 2005). While little information exists on their populations in open coastal systems, including the California Current upwelling system, it is generally understood that ultimately the benthic polyp stages contribute to seasonal and annual population variation of the adult medusae (NMFS 2012b), and that recruitment success during the juvenile (planula, polyp and ephyrae) stages of the life cycle can have a major effect on the abundance of the adult (medusa) population (Lucas et al. 2012). Activities that disturb the seafloor (described above) will likely either kill or displace any prey or other living habitat features, including any jellyfish polyps present, if this impact occurs on hard substrate. BOEM (2024a) requires lessees to develop plans that ensure seafloor areas of hard substrate will be fully protected from bottom contact, which would prevent the possible disruption of the jellyfish life cycle within the action area.

Given the minimal extent of disturbance and bottom contact anticipated, along with the measures required to minimize or prevent impacts, NMFS expects the consequences of suspended sediments, elevated turbidity, disturbance, and contact with the bottom community to be insignificant.

Effects on ESA Listed Turtle and Mammal Critical Habitat

Pacific Leatherback Critical Habitat

Critical habitat for leatherback turtles designated in 2012 for waters off the U.S. West Coast is defined at 50 CFR 226.207 (77 FR 4170). Critical habitat stretches along the California coast from Point Arena to Point Arguello east of the 3,000 meter depth contour, and also includes around 25,000 square miles stretching from Cape Flattery, Washington to Cape Blanco, Oregon, east of the 2,000 meter depth contour. In the final rule designating leatherback critical habitat, NMFS identified one primary constituent element essential for the conservation of leatherbacks in marine waters off the U.S. West Coast: the occurrence of prey species, primarily scyphomedusae of the order Semaeostomeae (e.g., Chrysaora, Aurelia, Phacellophora and Cyanea), of sufficient condition, distribution, diversity, abundance, and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks. The new critical habitat regulations (81 FR 7414) replace this term (primary constituent element) with physical or biological features (PBFs). This shift in terminology does not change the approach used in conducting our analysis, whether the original designation identified primary constituent elements, physical or biological features, or essential features. In this consultation, we use the term PBF to mean primary constituent element or essential feature, as appropriate for the specific critical habitat.

The proposed action area overlaps with leatherback critical habitat, with a complete overlap with the Morro Bay WEA. Critical habitat extends to a water depth of 80 m from the ocean surface. None of the activities in the proposed action would adversely affect the adult prey (medusa) of Pacific leatherbacks, although the potential impact to juvenile stages of jellyfish along the bottom could occur, if those activities impact hard substrate in depths less than 80 m (as described above), which is not expected. Any displacement of prey species or individuals as a result of limited vessel surveys and transits to and from the WEAs to their respective and/or alternative ports are anticipated to be short-term and temporary. Given that impacts to hard substrate/juvenile jellyfish habitat are expected to be avoided, and the limited extent of displacement of prey/foraging that could occur, we conclude the potential effects will be insignificant to designated critical habitat for leatherback sea turtles.

Humpback Whale Critical Habitat

Critical habitat for the endangered Central America DPS and the threatened Mexico DPS of humpback whales within waters off the U.S. West Coast was designated on April 21, 2021 (86 FR 21082), identifying prey as the single essential feature for both DPSs. For the Central America DPS, the prey essential feature is described as primarily euphausiids (*Thysanoessa, Euphausia, Nyctiphanes,* and *Nematoscelis*) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), and Pacific herring (*Clupea pallasii*), of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth. For the Mexico DPS, the prey feature is described as primarily euphausiids (*Thysanoessa, Euphausia, Nyctiphanes,* and *Nematoscelis*) and small pelagic schooling fishes, such as Pacific sardine (*Sardinops sagax*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasii*), capelin (*Mallotus villosus*), juvenile walleye pollock (*Gadus chalcogrammus*), and Pacific sand lance (*Ammodytes personatus*) of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth. Critical habitat for the Central America DPS of humpback whales contains approximately 48,521 square nautical miles (nmi^2) of marine habitat in the North Pacific Ocean within the portions of the California Current off the coasts of Washington, Oregon, and California. Specific areas designated as critical habitat for the Mexico DPS of humpback whales contain approximately 116,098 nmi^2 of marine habitat in the North Pacific Ocean, including areas within portions of the eastern Bering Sea, Gulf of Alaska, and California Current Ecosystem. The action area associated with the Morro Bay and Humboldt WEAs is almost completely overlapped by designated humpback whale critical habitat (Figure 5 in BOEM 2024). Any displacement of prey species as a result of vessel transits and surveys conducted as part of the Proposed Action are anticipated to be short-term and temporary; and therefore, insignificant to designated critical habitat for ESA-listed humpback whales.

Southern Resident Killer Whale Critical Habitat

The SRKW was federally listed as endangered in 2005 (70 FR 69903). Critical habitat for this DPS was designated in the summer core area in Haro Strait and waters around the San Juan Islands, Puget Sound, and the Strait of Juan de Fuca (79 FR 69054). In August 2021, additional critical habitat was designated along the U.S. West Coast from the Canadian border to Point Sur, California, between depths of 6.1–200 m (20–656 ft; 86 FR 41668), including much of the action area, but not the Morro Bay and Humboldt WEAs. Essential features for SRKW include: (1) water quality to support growth and development; (2) prey species of sufficient quantity, quality and availability to support individual growth, reproduction, development, as well as overall population growth; and (3) passage conditions to allow for migration, resting, and foraging. In particular, SRKWs show a strong preference for salmonids, particularly larger, older age class Chinook (79 FR 69054). Any displacement of prey species or individuals as a result of limited vessel transits, to and from the WEAs to their respective and/or alternative ports as well as limited and temporary introduction of contaminants, conducted as part of the proposed action, are anticipated to be short-term and temporary; and therefore, insignificant to designated critical habitat for the SRKWs. We do not anticipate significant impacts to water quality or passage conditions from the proposed action.

Steller Sea Lion Critical Habitat

Critical habitat for Steller sea lions was designated in 1993, and within the action area includes Sugarloaf Island, Cape Mendocino, Southeast Farallon Island, and Año Nuevo Island in California (58 FR 45269). Physical and biological features identified as essential for conservation of Steller sea lions include terrestrial, air, and aquatic habitats (as described at 50 CFR § 226.202) that support reproduction, foraging, rest, and refuge. Critical habitat includes an air zone that extends 3,000 feet (0.9 km) above areas historically occupied by sea lions at each major rookery in California and Oregon, measured vertically from sea level. Critical habitat includes an aquatic zone that extends 3,000 feet (0.9 km) seaward in State and Federally managed waters from the baseline or basepoint of each major rookery in California and Oregon. The Steller sea lion was federally listed as threatened in 1990 (55 FR 49204). In 1997, the eastern DPS (i.e., east of 144° W longitude) was listed as threatened, and the western DPS (i.e., west of 144° W longitude) was listed as endangered (62 FR 24345). The eastern DPS has since recovered and was delisted in 2013 (78 FR 66139). Critical habitat for the Steller sea lion remained in effect for the endangered western DPS, as the designated critical habitat remains to support the DPS' important biological functions (e.g., feeding and resting).

Although the proposed action area includes areas that remain associated with designated critical habitat, we do not expect that any individuals from the currently listed western DPS of Steller sea lions would occur within these areas. Based on genetic and tagging data, individuals of the listed western DPS of Steller sea lions are not known to visit the areas designated as critical habitat in Oregon or California (Bickham et al. 1996; Raum-Suryan et al. 2004). Additionally, there is no evidence that would suggest that the western DPS would need to expand into these areas in Oregon or California for recovery.

Neither of the California WEAs overlap Steller sea lion designated critical habitat, but project vessels could expose the aquatic and terrestrial habitats associated with the designated critical habitat to vessel noise if those vessels transit nearby heading into or out of port. While vessel noise could potentially impact resting, foraging, and refuge features on and surrounding the islands where critical habitat is designated within the action area, no ESA-listed Steller sea lions are expected to occupy any of these sites. Nonetheless, we consider the potential impacts of vessel noise on Steller sea lion behavior based on the anticipated sound exposures and acoustic disturbance distances that could occur if ESA-listed Steller sea lions were present. As none of the islands containing critical habitat are the subject of proposed survey activities, we anticipate that acoustic exposures would occur while vessels are in transit, and would thus be brief and temporary. Considering the acoustic disturbance distances for otariids (Table 12), Steller sea lions are either not likely to respond to this limited exposure to vessel noise that is expected to be generated by the proposed action, or are not likely to measurably respond to it in ways that would alter or disrupt normal behavior patterns such as resting or foraging.

Given that we do not anticipate that the proposed project activities could lead to measurable or meaningful effects to the physical or biological features essential to the conservation of the currently listed Steller sea lion DPS, we conclude the potential effects to designated critical habitat within the action area would be insignificant.

Effects on Critical Habitat of ESA Listed Marine and Anadromous Fish and Invertebrates

The critical habitat designations for coho salmon, Chinook salmon, steelhead, and SDPS green sturgeon use the term primary constituent element or essential feature. As previously discussed, we use the term PBF to mean primary constituent element or essential feature, as appropriate for the specific critical habitat. Critical habitat for the sunflower sea star is not being proposed.

<u>Salmonid Critical Habitat</u>

Within the range of the coho salmon, the life cycle of the species can be separated into five PBFs or essential habitat types: (1) juvenile summer and winter rearing areas; (2) juvenile migration corridors; (3) areas for growth and development to adulthood; (4) adult migration corridors; and (5) spawning areas. Within these areas, essential features of coho salmon critical habitat include adequate substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and safe passage conditions (NMFS 1999). The PBFs of coho salmon critical habitat associated with this Project relate to all PBFs with the exception of: (5) spawning areas. The essential features that may be affected by the proposed action include water quality, food, cover/shelter, and safe passage.

The PBFs of Chinook salmon critical habitat and the PBFs of steelhead critical habitat within the action area is limited to the estuarine area with: (1) water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (2) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and (3) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation (NMFS 2005). The essential features that may be affected by the proposed action include water quality and forage/food resources.

The only element of the proposed action expected to occur in, or potentially affect, critical habitat for ESA-listed salmonids is vessel traffic within estuaries, ports, or harbors. Effects to salmonid critical habitat PBFs described previously from vessel traffic are expected to be temporary and return to baseline conditions relatively shortly; and are therefore insignificant.

SDPS Green Sturgeon Critical Habitat

Critical habitat for SDPS green sturgeon includes PBFs for freshwater/riverine, estuarine, and marine environments. The PBFs of the estuarine areas includes: (1) food resources; (2) water flow (only pertaining to portions of San Francisco Bay); (3) water quality; (4) migratory corridor; (5) depth; and (6) sediment quality. The PBFs of the coastal marine areas includes: (1) migratory corridor; (2) water quality; and (3) food resources (NMFS 2006). The PBFs of freshwater riverine systems are not applicable.

The only elements of the proposed action that are expected to occur in, or potentially affect, SDPS green sturgeon critical habitat are vessel traffic while vessels transit or enter ports, or from the proposed bottom sampling activities along the cableway that connects the leases to shore. Softer substrates are expected to recover quickly after bottom samples are collected, and the avoidance measures proposed for hard substrates are expected to ensure hard substrates are not subjected to bottom-disturbing sampling. Therefore, the effects to SDPS green sturgeon critical habitat are expected to be temporary and return to baseline conditions relatively shortly; and are therefore insignificant.

Black Abalone Critical Habitat

Designated critical habitat for black abalone includes rocky intertidal and subtidal areas within the marine waters on portions of the California coast south of Point Arena from Mean Higher High Water to 6 meters depth. PBFs for black abalone critical habitat include rocky substrate (e.g., rocky benches formed from consolidated rock or large boulders that provide complex crevice habitat); food resources (e.g., macroalgae); juvenile settlement habitat (rocky substrates with crustose coralline algae and crevices or cryptic biogenic structures); suitable water quality (e.g., temperature, salinity, pH) for normal survival, settlement, growth, and behavior; and suitable nearshore circulation patterns to support successful fertilization and larval settlement within appropriate habitat. Critical habitat is not present near Humboldt Bay. In the vicinity of Morro Bay, critical habitat includes three Specific Areas in California within the action area: 1) Prewitt Creek, Monterey County to Cayucos, San Luis Obispo County 2) Montanã de Oro State Park in San Luis Obispo County to just south of Government Point, Santa Barbara County and, 3) from the Palos Verdes/Torrance border to Los Angeles Harbor Los Angeles County.

The only elements of the proposed action that are expected to occur in, or potentially affect, black abalone critical habitat are vessel traffic while vessels transit or enter ports, or from the proposed bottom sampling activities along the cableway that connects the leases to shore in the Morro Bay WEA. The avoidance measures proposed for hard substrates are expected to ensure hard substrates are not subjected to bottom-disturbing sampling. Effects to black abalone critical habitat are expected to be extremely unlikely; and are therefore discountable.

Conclusion

Based on this analysis, NMFS concurs with BOEM that the proposed action is not likely to adversely affect the subject listed species and designated critical habitats.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by BOEM where discretionary federal involvement or control over the action has been retained or is authorized by law and (1) the proposed action causes take; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the written concurrence; or (4) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). In the event any changes to the proposed action are considered, or new information arises regarding the effects of the proposed action or associated activities, NMFS encourages BOEM to contact NMFS for technical assistance if it has questions about whether there is any need to reinitiate consultation. NMFS also encourages BOEM to contact NMFS if it becomes aware of other data-gathering activities not carried out by lessees that may affect ESA-listed species. This concludes the ESA consultation.

This letter of concurrence includes an analysis of effects on sunflower sea star, a species proposed for listing under the ESA (50 CFR 223.102). If sunflower sea star is listed, BOEM must confirm with NMFS whether reinitiation is needed or if analysis within this LOC can serve as our concurrence that the proposed action is not likely to adversely affect sunflower sea star.

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. BOEM also has the same responsibilities, and informal consultation offers action agencies an opportunity to address their conservation responsibilities under section 7(a)(1).

There has been a significant increase in the number of whale entanglements reported to NMFS WCR since 2014. Numerous state and federal commercial and recreational fisheries have been implicated, as have some non-fishery origins, although only ~50% of these reports have been attributed to a known source. In response, there has been substantial activity surrounding this issue, including research, management actions, and litigation. Efforts by NMFS and other stakeholders have had some success, but there is work that needs to be done to ensure that measures for minimizing entanglement risk to whales and other protected species are focused on the most impactful origins.

One avenue that is being discussed coastwide in a number of different applications is the marking of gear lines that will be effective at identifying the origins from available documentation in entanglement reports, as well as feasible for fishermen and other ocean users to implement and maintain. All West Coast ocean activities that involve the deployment of lines (especially lines fixed in place for extended periods of time) that are known to have been and/or are capable of being involved in entanglements of whales and other protected species should consider implementing a line marking scheme that increases the probability that gear could be identified if involved in an entanglement to minimize the uncertainty associated with the origins. As such, BOEM could work with lessees to ensure that any lines deployed in association with the proposed action have distinctive markings that would be easily identifiable if involved in an entanglement that is documented and reported. Staff from NMFS WCR Protected Resources Division are available to help BOEM and lessee develop and implement a line marking scheme upon request.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Section 305(b) of the MSA directs federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects may result from actions occurring within EFH or outside of it and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (50 CFR 600.905(b)).

EFH Affected by the Proposed Action

The proposed project occurs within EFH for various federally managed fish species within the following fishery management plans (FMPs): Pacific Coast Salmon (Pacific Fishery Management Council (PFMC) 2016), Coastal Pelagic Species (PFMC 2019a), Pacific Coast Groundfish (PFMC 2019b), and Highly Migratory Species (PFMC 2018). The Pacific Coast

Groundfish EFH includes all waters from the mean high water line, and the upriver extent of saltwater intrusion in river mouths, along the coasts of Washington, Oregon, and California seaward to the boundary of the EEZ (PFMC 2019b). The east-west geographic boundary of Coastal Pelagic Species EFH is defined to be all marine and estuarine waters from the shoreline along the coasts of California, Oregon, and Washington offshore to the limits of the EEZ and above the thermocline where sea surface temperatures range between 10ºC and 26ºC. The southern extent of Coastal Pelagic Species EFH is the United States-Mexico maritime boundary. The northern boundary of the range of Coastal Pelagic EFH is the position of the 10ºC isotherm, which varies both seasonally and annually (PFMC 2019a). In estuarine and marine areas, Pacific Coast Salmon EFH extends from the nearshore and tidal submerged environments within state territorial waters out to the full extent (200 miles) of the U.S. Exclusive Economic Zone (EEZ) offshore of Washington, Oregon, and California north of Point Conception to the Canadian border (PFMC 2016). EFH for Highly Migratory Species FMP is defined to include the EEZ off the coasts of Washington, Oregon, and California (between 3 and 200 nautical miles offshore).

In addition, the project occurs within, or in the vicinity of estuaries, seagrass, rocky reef, and canopy kelp, which are designated as habitat areas of particular concern (HAPCs) for various federally managed fish species within the Pacific Coast Salmon and Pacific Coast Groundfish FMPs. HAPC are described in the regulations as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under the MSA; however, federal projects with potential adverse impacts on HAPC will be more carefully scrutinized during the consultation process.

Adverse Effects on EFH

NMFS determined the proposed action would adversely affect EFH as follows: The proposed action will introduce a variety of disturbances and impacts which will adversely affect EFH. Most of the effects are temporary and minor, although some effects will be rather long lasting and may disrupt HAPCs designated by the Pacific Coast Groundfish FMP. Effects to habitat features and prey are most profound for the benthic community, which overlaps most with EFH designated for the Pacific Coast Groundfish FMP, but also may occur for habitats near the ocean surface.

In total, anchors for UTPs, ADCPs, and metocean buoys, anchor chain sweep/chafe, and geotechnical and benthic sampling are anticipated to impact as much as 104,420 m^2 of the bottom. This area of the seafloor is expected to be disturbed by sampling equipment or occupied by anchors, which will likely either kill or displace any prey or other living habitat features such as corals, sponges, and sea pens. The area of benthic habitat that will be altered by the Project are expected to require one to several years to recover, with a limited number of organisms (such as some sea pens) being mobile and able to relocate. Deep sea corals, sponges, carbonate pavements, and methane seeps are fragile and sensitive to disturbance; some seafloor areas offshore California, including portions of proposed WEAs and potential cable routes for the Project, contain these habitats[6]. Various amendments to the Pacific Coast Groundfish FMP have prioritized protection of these deep water habitat features and closed these areas to bottom trawling by establishing EFH Conservation Areas (PFMC 2019b). Effects occurring over softer bottom substrates are expected to recover in less time, although the quality and quantity of habitat available will be temporarily diminished.

BOEM (2024a) requires lessees to develop plans that ensure seafloor areas of hard substrate, rock outcroppings, seamounts, or deep-sea coral/sponge habitat will be fully protected from bottom contact. Proposed activities that could contact the seafloor include: anchoring of metocean buoys, anchoring of ADCP moorings, anchoring of UTPs, anchoring of project-related vessels, geotechnical surveys, and benthic sampling. BOEM proposed that protection of the sensitive seafloor resources from bottom contact activities will be achieved if lessees include in their plans a 12 m (40 ft) buffer area, in addition to a description of the navigation equipment used to ensure anchors are accurately set and anchor handling procedures to prevent or minimize anchor dragging. Given the scale of sensitive seafloor habitat features within the action area, a 40-foot buffer is likely not adequate to provide protections from buoy and vessel anchoring activities for the following reasons. Some proposed activities lack precision, such as free fall deployments of metocean buoy anchors, due to the horizontal drift experienced between the time of release at the surface and contact on the seafloor. Due to the likelihood of unforeseen conditions during deployment of equipment, we consider the potential for error to be high and, consequently, the risk to habitats also high. Additionally, the sediment plume and turbidity expected from larger bottom contacts is expected to have negative consequences on benthic suspension feeders like corals and sponges. Large anchors, like those used for metocean buoys, will likely cause scour around the anchor and result in suspended sediments and elevated turbidity. We expect that turbidity effects will extend well beyond the proposed 40 ft buffer area and could have effects on sensitive and irreplaceable habitats. Lastly, we expect that anchor chain sweep or anchor dragging could extend impacts along the seafloor beyond 40 ft from the initial anchor site, resulting in potential damage to sensitive seafloor habitats.

The acoustic survey work introduces noise and sound levels that, as previously described in the ESA portion of this document, may affect individual fish which are prey resources that comprise EFH for all four of the PFMC's FMPs. Most life stages (including early life history stages) of both managed species and their prey will be exposed to sound levels as a result of the proposed action that will alter behaviors. Several studies have demonstrated that human-generated sounds may affect the behavior of fishes. BOEM (2024a) indicated physical injury and behavioral response effects to fish could occur due to sparkers and boomers used during proposed seismic surveys and did not estimate distances for effects from other HRG equipment (Tables 11 and 12).

[6] https://www.ncei.noaa.gov/maps/deep-sea-corals/mapSites.htm

As described in the ESA section of this letter, the underwater noise generated by airgun arrays is considerably louder than the equipment proposed for the HRG surveys. However, the response by fish to particular sound pressure levels produced by airguns is useful in assessing the response to HRG seismic equipment included in the proposed action. Engås et al. (1996) examined movement of fishes during and after a seismic airgun study by tracking the catch rate of haddock and Atlantic cod as an indicator of fish behavior and found a significant decline in catch rate of both species that lasted for several days after termination of airgun use. More recent work (Slotte et al. 2004) showed similar results for several additional pelagic species, including blue whiting and Norwegian herring. Unlike earlier studies, sonar was used to observe behavior of the local fish. They reported that fishes in the area of the airguns appeared to go to greater depths after the airgun exposure. Moreover, the abundance of animals approximately 30-50 km (18-31 miles) away increased, suggesting that migrating fish would not enter the zone of activity. Similarly, Skalski et al. (1992) showed a 52 percent decrease in rockfish (*Sebastes sp.*) catch when the area of catch was exposed to a single airgun emission at 186-191 dB re 1 Pa (mean peak level).

Based on the effects from airguns previously described, and analysis of HRG seismic equipment effects in BOEM (2024a), we expect that impacts from the use of sparkers or boomers will occur to habitat for Coastal Pelagic Species, Pacific Coast Groundfish, and Highly Migratory Species. Species included in these FMPs are expected to use waters in WEAs within the onset of physical injury and behavioral disturbance distances from sparkers and boomers presented in BOEM (2024a). Fish located within the onset of physical injury distance when boomers or sparkers are being used may be injured or killed. The impact will vary based on distance from the impulse source and potentially also depending on fish species and size. Additionally, fish within the behavioral disturbance distance are expected to leave (or avoid) the area when impulsive noise sources are used, temporarily reducing their ability to successfully complete critical life history functions such as foraging or migration. The timeframe for behavioral disruption will likely vary by species and life-stage as well as the number and strength of impulses produced in a given area during the HRG seismic surveys.

EFH Conservation Recommendations

NMFS determined that the following conservation recommendations are necessary to avoid, minimize, mitigate, or otherwise offset the adverse effects of the proposed action on EFH.

Background on Habitat Buffer

BOEM's *"Project Design Criterion 1: Hard Bottom Avoidance and Metocean Buoy Anchoring Plan"* proposes that as part of any site assessment plan (SAP), the lessee shall submit to BOEM the details of how these activities will avoid contact with hard bottom and sensitive ocean floor habitats by including in the SAP a buffer of at least 12 m (40 ft) for anchors from hard substrate, and to describe how the lessee will ensure anchors are accurately set, and include anchor handling procedures to prevent or minimize anchor dragging.

We can find no information in the BA or EFHA to explain or scientifically support the decision for the proposed 40-ft buffer distance. We understand that a 40-ft buffer was included in Condition 1.f.iv. "Anchoring Plan" of the California Coastal Commission's 2022 conditional concurrences for the Morro Bay and Humboldt lease areas.[7] In trying to understand the rationale for this Condition, we had discussions with staff at the California Coastal Commission as well as the California Department of Fish and Wildlife and California State Lands Commission. It appears that buffer size was originally applied to state project permits that occurred in much shallower waters. However, there has been acknowledgment to work towards identifying a larger buffer that would be better suited for the depths of the lease areas off California.

For BOEM's leasing activities off Oregon in 2024, the Oregon Department of Land Conservation and Development (ODLCD) included Conditions in their Consistency Determination for two buffers to protect sensitive habitats, and BOEM adopted these buffers in its lease terms and conditions as described in the 2024 Final Sale Notice (Sept 3, 2024). Condition #3 for an Anchoring Plan includes a buffer of 1,000 ft from the perimeter of hard substrate, rock outcroppings, seamounts, or deep-sea coral/sponge habitat locations. Condition #6 for Buffer Areas for Bottom-Disturbing Activities requires buffer of no less than 250 ft for all ground disturbing activities that fully protects hard substrate, rock outcroppings, seamounts, or deep-sea coral/sponge habitat from all bottom contact activities other than anchoring, including but not limited to, mooring, UTP placement, geotechnical equipment and installations used in site assessment and site characterization activities, and sediment sampling.

1. We recommend that BOEM adopt the same buffer distances that BOEM applied to the Oregon leases, i.e., a 250-ft buffer for all ground disturbing activities and a 1,000-ft buffer for all anchoring, to the five California offshore wind leases. BOEM's BA and EFHA did not include any scientific evidence to support the adequacy of a 40-ft buffer, and BOEM adopted greater levels of protection for sensitive habitats off Oregon for the same types of activities that interact with the same types of sensitive West Coast marine habitats. Furthermore, the buffers BOEM adopted for the Oregon leases are similar to buffers for similar BOEM actions in other regions of the country.

2. BOEM, NMFS, and partner agencies in the states of California and Oregon have discussed approaches to determining a sufficient habitat buffer size and the best available scientific information to inform such decisions. We request that BOEM and NMFS

[7] Consistency Determination CD-0004-22, (Morro Bay Wind Energy Area) and Consistency Determination CD-0001-22, (Humboldt Wind Energy Area). 2022.

continue collaborating to convene a workgroup among the relevant agencies with technical expertise and authorities to further explore these issues with the goal of reaching a common understanding of the best available science to inform buffers and agreement on a sufficient approach or approaches for habitat buffers relevant to offshore wind energy development along the West Coast.

3. Based on BOEM's analysis (Table 11), injury could occur to fish if they are close enough to sparkers or boomers used in seismic surveys. We expect this equipment could cause impacts to habitat for Coastal Pelagic Species, Pacific Coast Groundfish, and Highly Migratory Species, as species from these FMPs are expected near the ocean surface within WEAs. NMFS requests a meeting with BOEM to discuss suitable mitigation measures for these instruments.

Fully implementing these EFH conservation recommendations would protect EFH and HAPCs, by avoiding or minimizing the adverse effects described above.

Statutory Response Requirement

As required by section 305(b)(4)(B) of the MSA, BOEM must provide a detailed response in writing to NMFS within 30 days after receiving EFH Conservation Recommendations. Such a response must be provided at least 10 days prior to final approval of the action if the response is inconsistent with any of NMFS' EFH Conservation Recommendations unless NMFS and the Federal agency have agreed to use alternative time frames for the Federal agency response. The response must include a description of measures proposed by the agency for avoiding, minimizing, mitigating, or otherwise offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the Conservation Recommendations, the Federal agency must explain its reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)(1)).

Supplemental Consultation

BOEM must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR 600. 920(l)).

Please direct questions regarding the letter or other ESA or MSA questions to Tina Fahy via electronic mail at Christina.Fahy@noaa.gov or Matt Goldsworthy via electronic mail at Matt.Goldsworthy@noaa.gov.

Sincerely,

Dan Lawson
Long Beach Office Branch Chief
Protected Resources Division

cc: Administrative File: 151422WCR2024PR00211

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